ACCESS TO CARE AMONG ASIAN AMERICANS:

ASSESSING DETERMINANTS OF USUAL SOURCE OF CARE

by
Eva Chang

A dissertation submitted to Johns Hopkins University in conformity with the requirements for the degree of Doctor of Philosophy

Baltimore, MD
October 2013

© Eva Chang 2013
All Rights Reserved

ABSTRACT

Objective. To understand the variations and underlying mechanisms of access to care among Asian Americans adults (18-64 years).

Methods. Data were from the California Health Interview Survey. Logistic regression models were used to assess variation in having a usual source of care (USC) between Asian Americans and non-Hispanic whites and among Asian American ethnic subgroups (Chinese, Filipinos, Japanese, Koreans, Vietnamese, South Asians, and Other Asians) and to examine race- and ethnicity-specific associations with acculturation factors (English proficiency, length of residence, and residence in a concordant neighborhood), key enabling characteristics (employment, income, insurance), predisposing resources (education) and need (health status). Path analyses were conducted to test the applicability of the Andersen health behavioral model for all Asian Americans and 3 Asian ethnic subgroups (Chinese, Korean, and Vietnamese), to examine underlying relationships that influence having a USC, and how acculturation affects the model.

Results. Once all factors were accounted for, odds of having a USC were 23% lower in Asian American adults than non-Hispanic white adults, but this difference was not statistically significant. However, Koreans had consistently lower odds of having a USC compared to all other Asian ethnic subgroups except Japanese. Japanese also had lower odds of having a USC than Chinese and South Asians. The Andersen health behavioral model adequately predicted having a USC among Asian Americans. Health insurance coverage was strongly and consistently associated with having a USC across all Asian Americans and Asian ethnic subgroups. Furthermore, it was on the direct pathway to having a USC through which other factors influenced having a USC. Income did not appear to be a barrier to having a USC for most Asian Americans. Employment was associated with having a USC among all Asians and Chinese, but did not appear to be associated with having a USC for the other subgroups. Educational

attainment was associated with having a USC for all Asians, through some of its relationships were unexpected. Health status had an indirect association to having a USC. Acculturation played a significant role in explaining the disparity in having a USC between Asian and non-Hispanic white adults, but did not significantly contribute to the USC pathways.

Conclusions. Variation in having a USC was observed between Asian American and non-Hispanic white adults and among Asian ethnic subgroups. Significance, patterns, and pathways of key factors associated with having a USC varied by race and by ethnic subgroup. The Andersen model was appropriate for studying USC among Asian American adults. Acculturation and its measures may need to be re-examined and further tested. Findings suggest that increasing health insurance coverage will help improve access among Asian Americans, yet complementary outreach to educate Asian Americans about the importance of having a USC will be needed.

Committee.

Kitty S. Chan, Ph.D. (Advisor)
Hae-Ra Han, Ph.D., R.N. (Chair)
Jennifer L. Wolff, Ph.D.
Deanna L. Kerrigan, Ph.D.
Jodi B. Segal, M.D (Alternate)
Janice V. Bowie, Ph.D. (Alternate)

Funding.

The project described was supported by grant number 1R36HS021064-01 from the Agency for Healthcare Research and Quality. Its contents are solely the responsibility of the author and does not necessarily represent the official views of the Agency for Healthcare Research and Quality.

This work is dedicated in loving memory to my grandparents, Chen Hua Chang, Liu Hsin-Shuang Chang, and Yang Chow-Kim Ho. Their love, support, and experiences have inspired and nurtured my dreams.

ACKNOWLEDGEMENTS

As with all journeys worth traveling, the one to the PhD was full of twists and turns. What makes it truly worthwhile are the people who journey with you as guides and companions to help you fight your battles, both within and without. This body of work would not have been realized without them.

I am deeply indebted to my advisor, Kitty Chan, for her support and guidance throughout the entire PhD process. She has been an inexhaustible force who has pushed me to be a better researcher from the very first day. Among countless other things, she has tried to teach me to be more precise with my research questions and to always consider the story. Thank you for your patience and your thought-provoking (and extra Stata-running) advice. I am also grateful to the rest of my committee members, Hae-Ra Han, Jennifer Wolff, and Deanna Kerrigan, who have provided amazing feedback to help me consider the greater implications of my work.

To my internship mentors, Judy Sangl and Ernie Moy of the Agency for Healthcare Research and Quality and Don Hayes of the Hawai'i Department of Health. They have been invaluable in helping me find policy-relevant projects and providing me the space to explore my interest in disparities in health services among ethnic minority populations within their organizations.

I am also greatly appreciative to Mary Sewell, Judy Holzer, and the rest of the HPM administrative staff who have always gone out of their way to help me.

To the team at the California Health Interview Survey Data Access Center, I am thankful for all of their assistance. From running the majority of my analyses to

purchasing Mplus so that the third manuscript was possible, they have provided with me with invaluable technical assistance.

I would like to acknowledge my funding sources: the Agency for Healthcare Research and Quality T32 training grant for pre-doctoral students for stipend and PhD tuition support during my first 2 years, the Agency for Healthcare Research and Quality R36 dissertation grant for research, stipend and PhD tuition support for my last year, and the Marilyn Bergner Award for research support.

Now to my family and friends who have been instrumental in helping me with my battles within. To my old and new friends who have taken the PhD journey with me, thank you for helping me through this process. I am so lucky to have such an amazing group of friends with whom I can both struggle through homework assignments and have a beer and pontificate about the meaning of life (after PhD). Especially to Matthew Lee who provided endless patience and loving support. To my family, who may not have been able to help me with my academic work, your understanding and love have given me a foundation to flourish upon. My parents, Yenping and Mangping, have instilled in me the love of learning and the desire to always be better. My sister, Elaine, has inspired me to always get up again and persevere. Particularly to my grandparents, Chen Hua Chang, Liu Hsin-Shuang Chang, and Yang Chow-Kim Ho. Although they could not see me graduate, their experiences were the true source of inspiration for this work and I know they would be proud of me.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: INTRODUCTION

Background and Significance

The Growing Presence of Asian Americans in the U.S.

Between 2000 and 2050, the United States population is projected to grow by 49%, or by more than 137 million individuals.[1] By comparison, the Asian American population, the fastest growing group, is projected to grow by 213% while the Hispanic population is projected to grow by 188%, thus greatly increasing the diversity of the US population.[1] Much of the population growth for Asians is attributed to immigration.[2] According to the 2011 Current Population Survey, approximately 61% of all Asians are foreign-born.[3] Asians originate from at least 29 Asian countries, with over 30 ethnic groups and 800 languages or dialects.[4,5] Each group brings its own distinct cultures and histories.

Overall, Asians consist of 4.8% of the general US population and 13.1% of the California population, the state where over 33% of all Asians reside.[6] The six largest Asian ethnic subgroups in the U.S. are Chinese (including Taiwanese), Asian Indian, Filipino, Vietnamese, Korean, and Japanese, making up more than 85% of the total Asian population in the US.[7] Chinese are the largest group, making up 23% of the Asian population, followed by Asian Indian (19%), Filipino (17%), Vietnamese (11%), Korean (10%), and Japanese (5%). The population percentages are generally mirrored in California where Chinese make up 26% of the Asian population, followed by Filipino (24%), Vietnamese (12%), Asian Indian (11%), Korean (9%), and Japanese (6%). As the Asian population continues to grow and diversify in the US, it is important to understand differences in health and health behavior in Asians a whole and in specific Asian ethnic subgroups.

Having a Usual Source of Care

Although an explicit goal of the US healthcare system, access to healthcare is a complex concept.[8–10] In 1993, the Institute of Medicine defined access to care as "having timely use of personal health services to achieve the best health outcome."[11] Using this definition, different ways to measure the multiple dimensions of access have been developed. These include utilization of healthcare services and presence or absence of resources that facilitate healthcare access.[10] While utilization measures, such as frequency of physician visits or use of specific services, are commonly used indicators of access, they are influenced by patient health status and preferences, or may be relevant only for subpopulations needing particular services.[11] In contrast, measures of access such as having insurance and a usual source of care (USC) are key facilitators of entry into the healthcare system and timely use of services that are applicable to the general populations. Furthermore, having one or both have been shown to improve health outcomes.[12] This dissertation focused on having a USC because the mechanisms and influences of this important aspect of access to care are not well understood.

Having a USC is often defined as the person or place an individual usually goes to when they are sick or in need to medical advice.[13] Having a usual place allows for continuity of medical care in that a person's medical records and history are accessible in a single location while having a usual provider has the added benefit of allowing for a closer provider-patient relationship. Despite these distinction, there are marked advantages in having either a usual person or place compared to lacking a USC.[14–16] The link between having a USC and better health outcomes and healthcare experiences has been well-established. The literature has found that having a USC is associated with a number of outcomes associated with improved health quality and costs, including better health outcomes, timely and appropriate utilization of preventive and primary care services, improved chronic disease management, lower costs, increased satisfaction with care, and decreased emergency department use.[9,12,14,16–19] Having a USC has been shown to increase health seeking behavior in general; this effect is especially strong among immigrants.[20]

Studies have also found that the benefits of having a USC are independent of the benefits of having health insurance. An study in Taiwan showed that having USC improved the quality of medical care experiences despite the presence of universal insurance coverage.[21] In the US, having a USC has been found to be more important than health insurance in receiving timely care and having physician visits.[22] Having a USC has an equal or stronger effect on receiving preventive and condition-specific services than health insurance, though having both a USC and health insurance results in an additive effect in likelihood of receiving services.[17,23–25]

Why Having a Usual Source of Care is Important for Asian Americans

Asians are 1.3 times more likely than whites to lack a usual primary care provider.[26] Having a USC is especially important for Asians for a number of reasons, most importantly because Asians, both by race group and by ethnic subgroups, have a similar or higher risk of several chronic and acute diseases compared to non-Hispanic whites.[27,28] The tuberculosis incidence rate in Asians is 26 times that of non-Hispanic whites, while incidence rate for foreign-born Asians is 21 times that of US-born Asians.[29,30] Stomach and liver cancer incidence and mortality rates in Asians are more than double rates observed in non-Hispanic whites.[31] Wide variation in cancer mortality and incidence rates can be observed by Asian ethnic subgroup, for example stomach cancer incidence rates range from 54.6 per 100,000 among Koreans to 7.2 per 100,000 among Filipinos.[31]

The health consequences of these diseases among Asians is compounded by lower rates of common screenings and follow-up exams among Asians.[32–34] For example, having a USC has been shown to improve both the quality of diabetes-related care and outcomes, including better glycemic control and greater likelihood of receiving recommended diabetes-specific services such as diabetic eye and foot exams.[25,35] The lack of a USC may have contributed to lower prevalence rates of eye exams and foot exams and higher probability of missing common complications of diabetes.[36] Similarly, despite higher incidence rates of cervical cancer among all Asian and

especially Vietnamese women (8.8 and 14.0 per 100,000, respectively, compared to 7.3 per 100,000 among non-Hispanic white women), more than 30% of Asians and Vietnamese women had never been screened or not been screened within the past 3 years compared to 16% of non-Hispanic white women.[31] Improving the likelihood of having a USC among Asians would increase the likelihood of early detection of diseases, many of which are preventable or manageable, and facilitate the timely treatment of medical care.

Literature Review

Variations in Having a Usual Source of Care in Asian Americans

When comparing all Asians[1] with other race groups, the 2012 National Health Disparities Report reported that Asians were less likely to have a usual primary care provider compared to Whites for 7 of 8 years between 2002-2009.[10] However, previous studies have found inconsistent results regarding access to care based on different data sources and populations of interest.[37–39] Given the diversity of ethnicities, cultures and migration histories, several researchers have challenged the appropriateness of grouping all Asians together and encouraged use of disaggregate Asian ethnicity group[2] to understand subgroup differences.[5,40,41] Age-adjusted percent distributions from the 2004-2006 National Health Interview Survey (NHIS) showed stark variations across access to care indicators and subgroups.[42] The prevalence of Asian adults who lack a usual place for healthcare ranges from 12% among the Japanese and 25% among the Koreans compared to 13% among non-Hispanic white adults. The few studies published comparing access among Asian subgroups found significant differences in access between Asian ethnic subgroups and non-Hispanic whites.[43–48] However, most of these studies focus on

[1] The Office of Management and Budget (OMB) defines the Asian race category as "a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam".[206]

[2] For the purposes of this study, ethnicity may be defined as membership in population groups that are characterized by a common ancestry, language, and custom. [207]

children[43,44] or cancer screening outcomes among Asian women[45–47], and do not include a general access indicator that is relevant for all Asians. Three studies did look at having a USC by Asian ethnicity, but the results were mixed. Two of the studies showed heterogeneity in having a USC between the different Asian ethnic subgroups, yet they did not agree about which groups had relatively better and worse access, while one study did not find any significant differences in routine care or sick access among subgroups.[48–50] Frisbie et al. found that Korean American adults (25 years or older) have a 87% higher odds of not having a regular source of care and Filipinos to have 42% lower odds compared to Japanese American adults using the 1993-1995 NHIS.[48] Nguyen found Vietnamese adults (50 years or older) to have 62% lower odds of having a USC compared to Chinese adults.[49] The relative lack of literature on comparing USC among different adult Asian subgroups highlight the need to evaluate distinct Asian ethnic groups to better understand unique patterns in access to health care services. Understanding of these patterns is important for developing targeted interventions for each subgroup to improve the effectiveness of health care services.

Factors Influencing Access to Care in Asian Americans

Understanding how specific factors influence access to care among Asians is an important first step in understanding variations in care access. In addition to socioeconomic status (education, income, and employment) and health insurance coverage, the high concentration of immigrants within the Asian American population demands consideration of the psychosocial and cultural effects of immigration, or acculturation, on access.[48,51–55] The acculturation domains commonly assessed in minority health include language use, social affiliation, and cultural identification.[56] Variations in health outcomes have largely been attributed to linguistic barriers and the lack of familiarity and comfort with the health system that stem from diverse immigration histories and subsequent adjustment periods to American culture.[43,45,48,53,57] Apart from a small percentage of Asian laborers prior to 1956, there have been 2 distinct groups of Asian migrations

to date.[58] The first group, including Chinese, Filipinos, Koreans, and South Asians, migrated to the US for educational and work opportunities. The second group, including Vietnamese, Cambodian, and Laotian, were largely refugees seeking asylum in the US. Accounting for acculturation and specific histories may contribute to the understanding the differences in health and health behaviors among Asians.[48]

Due to the paucity of literature in access to care among Asians, this review includes related literature using different populations (i.e., immigrants, non-citizens) and related access outcomes (i.e., utilization).

Acculturation in Asians: English Proficiency, Length of Residence, and Residence in a Concordant Neighborhood

Although acculturation is believed to be a key factor of health and health access for ethnic minority populations, studies focusing on the effects of acculturation have been inconsistent in their use of acculturation-related variables and their findings.[53,59–61] Studies have examined the effects of individual-level acculturation by comparing populations based on English language use and length of residence in the US. [43–45,48,60,62–70] Studies looking at English language proficiency have shown mixed findings depending on how the indicator is measured and the specific outcome in studies comparing all Asians to whites and comparing Asian subgroups.[45,66,67,70–72] On the other hand, length of residence has a strong and robust effect on access to care on all immigrants.[48,52,62] Immigrants and non-citizens who have been in the US for less than 5 to 10 years are less likely to have a USC than US-born individuals and citizens, respectively.[48,71,72] Generally, immigrants who arrived as children have been found to have better access to services than those who arrived as adults.[62] However, the trend for Asian immigrants appears to differ; Asian immigrants who arrive in the US later in life have comparable access to those born in the US.[62] Other studies suggest the importance of length of residence to utilization of health services depends on the Asian subgroup.[63] The variability in findings suggests that

language proficiency and length of residence alone do not adequately explain the observed differences in care access for Asian immigrants.

Conceptualizations of acculturation recognize the importance of understanding how communities might influence health and access to care.[61,73–75] Health, health behaviors, and acculturation may be positively or negatively influenced by the social, cultural and economic factors of where an individual lives. Ethnic neighborhoods or enclaves (communities with a high proportion of ethnic minorities) provide cultural goods and social ties that may alter an individual's time to adaptation to a new culture but also serve as a resource of health knowledge for immigrants and individuals of low acculturation.[73,74,76] Due to the low number of Asian neighborhoods in the US, there is a lack of national-level research on the impact of ethnic neighborhoods on Asian access.[75] Findings among Latino populations, which also have a large percentage of immigrants, suggest that ethnic neighborhoods may be an important factor of access to care for Asians, as access to social networks may promote health services use.[75,77] However, beneficial effects of using a general Asian ethnic composition indicator for all Asians may be diminished if multiple Asian subgroups live in the same neighborhood due to the lack the cultural and language concordance among Asian subgroups.

Furthermore, the effect of living in an ethnic neighborhood on care access can differ from one subgroup to another. One small study focusing on Marshallese, Filipino and Korean immigrant communities in Hawaii found that Filipinos living in immigrant Filipino communities have better access to care than Koreans in immigrant Korean communities, despite lower income and educational attainment among the Filipinos.[78] Another study found that the neighborhood that immigrants resided in may simultaneously improve and worsen health, depending on the outcome measured.[79] Residence in a specific ethnic enclave may have contextual effects that cannot be explained by personal factors such as length of residence and English proficiency. These effects need to be better explored since associations appear to vary by ethnic groups. It is also important

to note that the studies on Asian neighborhoods have focused on immigrant populations.[78,79] Extending this area of research to include all Asians by ethnic groups will affect both immigrant and low-acculturated US-born Asians, a group that has largely been excluded from research studies.

Education, Income, Employment, and Health Insurance Coverage in Asians

Although Asians have higher average levels of educational attainment and median household incomes compared to non-Hispanic whites, they also have higher rates of poverty, lower employment rates, and lower rates of health insurance coverage.[2,80,81] This polarity may be partially explained by differences among subgroups across all factors.[2,4,80–82] Differences in how the factors are measured also contribute to difficulties in comparing findings across studies. Based on the access and utilization studies published, health insurance coverage is clearly a significant factor of access among all Asians.[63,83–85] A recent study suggested that insurance may also be an important mediator between immigration status and USC.[86] However, due to the wide variety of outcomes and subpopulations studied, it is not surprising that clear relationships between access to care and education, income and employment have not been established for Asians.[44,45,63,83–85,87,88] Relative importance of these factors also appear to vary by Asian subgroup.[63,78] In the small study comparing immigrant populations in Hawaii, Marshallese residents have the best access to care despite having the lowest socioeconomic status, largely due to health insurance assistance not available to other immigrants.[78] This study suggests that different subgroups may have different relationships with the predisposing and enabling resources. The variability in the findings emphasizes the need to understand these factors for all Asians and Asian subgroups, since analyses of these factors may help identify possible policy interventions.[89]

Direct and Indirect Pathways to Having a USC

The Andersen and Aday health behavioral model illustrates that predisposing characteristics, enabling resources, and need have both direct and indirect effects on access to care.[90] Previous studies using the Andersen and Aday model for the general population have found, among predisposing characteristics, advanced age, being female, being married, and higher educational attainment to be positively associated with having a USC.[91–94] Having health insurance, employment, and high household incomes are enabling resources that have also been found to be positively associated with access to care. Furthermore, these enabling resources have also been shown to be mediating factors between predisposing characteristics and access for different populations.[17,71,86,90–93,95–97] Previous studies testing pathways have determined that need is the most successful predictor of utilization.[51,95,97] However, studies examining having a USC have had mixed findings on the influence of health on having a USC, especially in immigrant populations, and health status plays almost no role in explaining disparities in access.[49,71,93]

Only a handful of studies have examined the influence of acculturation on access in Asians. Although highly disparate and focused on small, specific subpopulations, studies suggest that the influence of acculturation varies by subgroup and outcome but are important explanatory factors of the health and health behaviors of Asians.[51,98–100] When examining health care utilization in Korean American immigrants with high blood pressure, Song et al. integrated immigration-related factors to the Andersen model to identify possible immigrant-specific barriers.[51] The authors determined that length of residence indirectly influenced utilization through insurance. On the other hand, looking at three generations of Mexican Americans, Markides et al. tested three measures of acculturation in a utilization path model. None of the measures (ethnicity of friends, language use, and having traditional Mexican values) were observed to be directly associated with physician utilization, but there was limited evidence of indirect associations through need.[95] These studies further emphasize the substantial gap in

knowledge about the direct and indirect effects of important factors of access to care for the broader Asian population.

Innovation

This study is the first to systematically examine the pathways through which acculturation factors, predisposing characteristics, and enabling resources relate to USC among all adult Asians (18-64 years) using population-based survey data. The applicability of the Andersen and Aday health behavioral model will be tested for understanding the factors important to having a USC among Asian American adults, including the pathways through which these factors influence having a USC. This study also is the first to identify subgroup-specific associations and pathways to having a USC. A better understanding of these relationships will facilitate future development of targeted, subgroup-specific policies and interventions.

Conceptual Model

Several theories and frameworks have been developed to better understand the factors associated with health care access. Widely used models include the health belief model, the theory of planned behavior model, the models of planned decision making, the Access as FIT model, and the health behavioral model.[101–103] While many of these models were considered, the Andersen's behavioral model of health services utilization and access was adapted and used for this study.[90,104] This model was chosen for its appropriateness in identifying and measuring health services access and its predictors, its wide use and acceptance in the literature, and its flexibility to incorporate other concepts specific to the population of interest.[101–103]

First proposed in 1968, Andersen's health behavioral model hypothesizes that access and use is related to the propensity an individual has to use services (predisposing), the means a person has to use services (enabling), and the individual's need for services.[90,105] Predisposing characteristics, such as age, gender, and educational attainment, are related to an individual's

likelihood to seek healthcare services and are characterized by their lack of modifiability. Enabling resources, such as insurance and income, explain an individual's means or capacity to seek healthcare and are usually modifiable. Finally, need is the perceived and evaluated need for health care and may include self-perceived health status. Originally conceptualized as a stage model, predisposing characteristics are expected to indirectly influence access through the enabling characteristics, and enabling characteristics and need were to directly influence access.[90,101]

For minority groups, the health behavioral model has been criticized for its lack of sensitivity to cultural and structural barriers in health care. Andersen et al. responded by expanding the model to be generalizable to more diverse populations and delineated how population and individual characteristics specific to racial and ethnic populations may be carefully integrated into the model.[106] Specifically, Andersen proposed to include characteristics and behaviors such as language, length of time in a community, health beliefs, acculturation, and use of alternative medicine.[106] Researchers have also adapted the model to fit specific populations and purposes. In particular, several studies have included proxy measures of acculturation to account for the adaption process that immigrants experience. Models that incorporate acculturation generally include a mix of minority-specific predisposing and enabling characteristics that pertain to the population studied.[45,52,71,86,107,108] A modified Andersen behavioral model presented by Kuo and Torres-Gil for service utilization by older Taiwanese (Appendix A) incorporated minority and immigrant-specific variables, including years since immigrated, use of alternative medicine, preference for culturally sensitive providers, and English proficiency, to the basic model framework.[107]

Figure 1.1 presents a general model of hypothesized relationships for the variables of interest in this study. Augmented by the literature review and the modified model presented by Kuo and Torres-Gil, the model highlights race/ethnicity and additional factors that are relevant to

Asian Americans. The directionality of the influences between the individual characteristics, acculturation, and access are not specified because exact relationships are hypothesized to vary between the Asian American model and the Asian ethnic subgroup models.

Specific Aims and Hypotheses

Aim 1: To determine how acculturation factors and other key predisposing and enabling resources affect likelihood of having a usual source of care in Asian American adults.

Hypothesis 1.1: Asian American adults will be less likely to have a usual source of care compared to non-Hispanic white adults even after controlling for predisposing characteristics (education) and enabling resources (income, employment, health insurance coverage).

Hypothesis 1.2: Acculturation factors (time in the US, English proficiency, residence in a concordant neighborhood) will help explain differences in usual source of care between Asian American and non-Hispanic white adults.

Hypothesis 1.3: The general Andersen health behavioral model will predict having a usual source of care in Asian American adults.

Hypothesis 1.4: Length of residence, English proficiency and residence in a concordant neighborhood will directly and indirectly influence pathways to having a usual source of care for Asian American adults.

Aim 2: To determine whether the factors influencing the likelihood of having a usual source of care differs by Asian American ethnic subgroup.

Hypothesis 2.1: The likelihood of having a usual source of care will vary by Asian American subgroups (Chinese, Japanese, Korean, Filipino, South Asian, and Vietnamese) after controlling for acculturation factors, predisposing characteristics, and enabling resources.

Hypothesis 2.2: Significant differences in the interrelationships of predisposing characteristics, enabling resources and need with having a usual source of care will be observed between three major Asian American subgroups (Chinese, Korean, and Vietnamese).

Dissertation Organization

This dissertation is organized using the three-manuscript format and includes six chapters. This chapter presents background information, a literature review describing the current status of research in this area, conceptual model with aims and research hypotheses. Chapter 2 provides a brief overview of the research methods used in the study, including the data source, study variables, and statistical analyses. Chapters 3, 4, and 5 are three separate manuscripts intended for submission to peer-reviewed scientific journals. Since each manuscript is expected to stand alone, some sections and information are repeated.

Chapter 3 focuses on Aim 1, Hypotheses 1.1 and Hypothesis 1.2. Specifically, it determines whether Asians are less likely to have a USC compared to non-Hispanic whites even after controlling for acculturation and key predisposing and enabling factors. The paper further examines how acculturation factors and key predisposing and enabling resources differentially influence having a USC in non-Hispanic white and Asian adults.

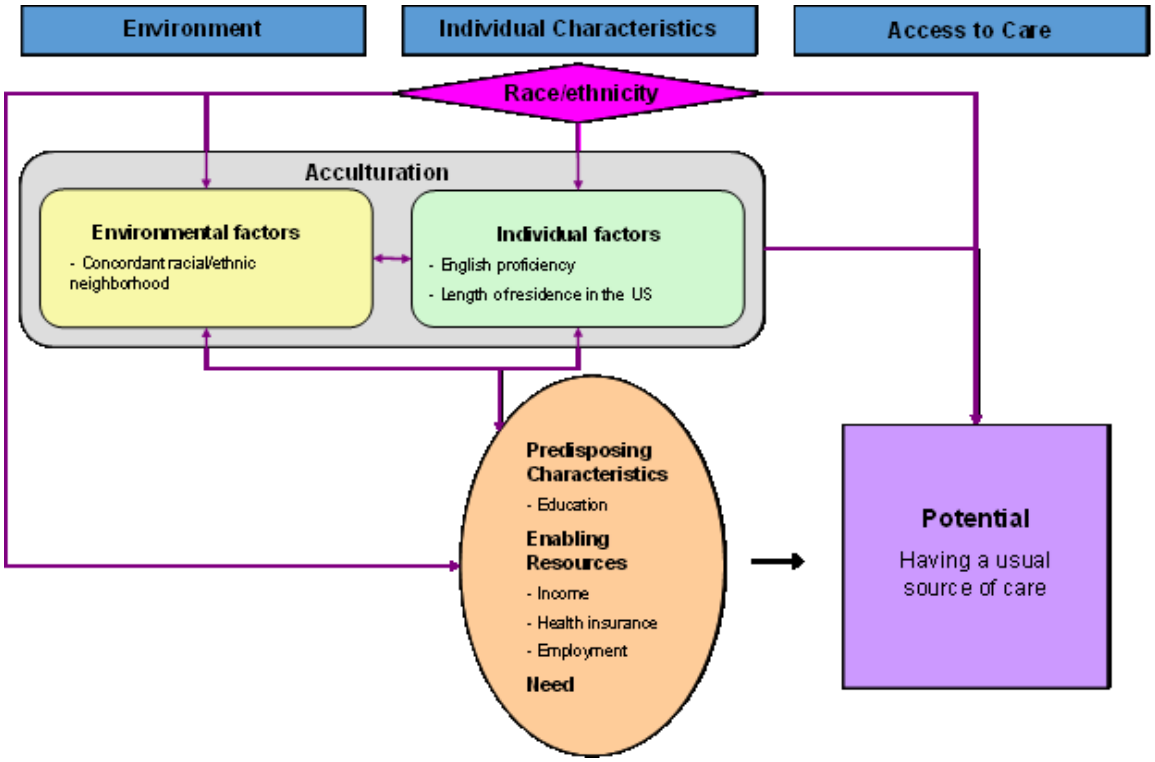
Chapter 4 addresses Aim 2, Hypothesis 2.1 and seeks to understand having a USC among Asian ethnic subgroups by determining how having a USC varies by Asian subgroups (Chinese, Filipinos, Japanese, Koreans, Vietnamese, and South Asians) after controlling for acculturation and key predisposing and enabling factors. This paper also identifies subgroup-specific factors for having a USC for the future development of targeted, subgroup-specific interventions.

Chapter 5 builds from the first two papers and addresses Hypotheses 1.3 and 1.4 from Aim 1, and Hypothesis 2.2 from Aim 2 to examine how appropriate Andersen's behavioral model is for Asian Americans and for three key Asian ethnic subgroups (Chinese, Korean, and

Japanese). It also tests the Andersen health behavioral model to observe whether the acculturation factors, length of residence, English proficiency and residence in an ethnic enclave, impact likelihood of having a USC for all Asian Americans.

Finally, Chapter 6 provides a synthesis of the research findings from the 3 previous chapters, highlighting the strengths and limitations of the study and provides relevant research and policy implications and recommendations for future research.

Figure 1.1. Acculturation and Access to Care Conceptual Model



CHAPTER 2: RESEARCH METHODS

Data Sources

Study analyses were based on the California Health Interview Survey (CHIS), a cross-sectional, random-digit-dial telephone survey that was conducted biennially between 2001 and 2009 in California. It is the largest statewide survey in the nation and represents the non-institutionalized population in California. The survey is conducted by the UCLA Center for Health Policy Research in collaboration with the California Department of Public Health and the Department for Health and Human Services. CHIS provides a comprehensive picture of the health and health care needs of the diverse population of California. The survey has statewide and county-level information to provide both an overview of the overall population and more detailed information for health planning purposes. CHIS data and results are used extensively by organizations, including federal and State agencies, community organizations, hospitals, and researchers to assess health and health care and to develop policies and strategies for health care services.[109,110]

The sampling plan follows a multi-stage sample design aimed to provide estimates for most counties and groups of counties for small populations, for the overall population, and for several smaller ethnic groups in California. The random-digit-dial sample includes telephone numbers assigned to landlines in 2005 and to landlines and cellular service in 2009. The sampling plan oversampled Koreans and Vietnamese to increase the precision of estimates for these groups. Both the 2005 and 2009 landline sample sizes were sufficient to accomplish this objective.[109,111]

The telephone interviews were conducted in five languages: English, Spanish, Chinese (Mandarin and Cantonese), Vietnamese and Korean. These languages were identified as the languages that would cover the largest number of Californians who did not speak English or did not speak English well enough to participate in the survey, based on the 2000 census data. The data collection was performed by Westat. One adult per sampled household was randomly

selected to be interviewed for both landline and cellular samples. There were a total of 43,020 adults interviews conducted in 2005 and 47,614 adult interviews in 2009. The overall response rate for adult interviews was 26.9 percent in 2005 and 15.6 percent in 2009 (landline response rate was 17.7 percent and cellular phone response rate was 10.8 percent).[112,113] More than 10 and 12 percent of interviews were in a language other than English in 2005 and 2009, respectively.

The sample was weighted to produce population estimates from the data. The objectives of the weighting procedures were to compensate for differential probabilities of selection of households and persons, to reduce bias from non-respondents, to adjust for possible under-coverage in sampling frames, and to reduce the variance of the estimates.[114,115] Person-level weights were created using the raking method to make the CHIS estimates consistent with population totals. The raking method is an iterative process that forces the weights to sum to known, external population totals. The population totals for number of individuals by age, race and sex at the stratum level for CHIS were created from the California Department of Finance's Population Estimates and Population Projections. The variance estimation procedures used for CHIS were replication and linearization (also known as Taylor series approximation). Replication weights were created because of their ease of use at the analysis stage and because they are able to account for adjustments made in the weighting and raking. The replication method used for CHIS was a paired unit jackknife method ($JK2^{15}$). The Taylor series method estimates the variance based on a linear statistic. The replication weight method is often used for public use survey data because it better protects the identity of the respondents, especially in areas with small samples.[116] This dissertation used the replication method for manuscripts 1 and 2 (Chapters 3 and 4) because of its accessibility in the CHIS public use dataset. Manuscript 3 (Chapter 5) used the Taylor series linearization method so that fit statistics could be produced with Mplus. The Taylor series weights were considered confidential data and accessed through the CHIS Data Access Center.

Data were imputed for nearly every variable to increase the analytic usability of the data set in all years.[114,115] Westat imputed the missing variable for the weighting process and CHIS staff imputed values for the other variables. The weighting variables were imputed using two imputation procedure, a completely random selection from the observed distribution of the respondents and a hot deck imputation without replacement. CHIS staff used logical or relational imputation, using valid replacement values when possible, and model-based hot deck imputation for other missing values. The model-based hot-decking method replaces missing values for one respondent based on a valid response from another respondent with similar characteristics. The characteristics used to form the donor pool always included age group, gender, race/ethnicity, poverty level, educational attainment and region. Other control variables may have been used as appropriate to the missing item. In the 2005 and 2009 data, less than 3 percent of all respondents did not respond to items associated with race/ethnicity, usual source of care and most other key variables used in the analysis. Household income had a non-response rate of greater than 20 percent.

Study Population

This dissertation used both publicly available and confidential data from CHIS to study the factors associated with having a usual source of care (USC) among Asian American adults (18-64 years) residing in California. Elderly adults (65 years and older) were excluded because their health accessing behaviors have been shown to be different than non-elderly adults, due to the elderly's high health needs and near universal healthcare coverage through Medicare. For manuscripts 1 and 2 (Chapters 3 and 4), two years of data (2005 and 2009) were pooled to yield sufficient statistical power to explore health access among specific Asian American subgroups. The 2007 CHIS data were not included due to concerns related to changes in phrasing prior to the question related to having a USC; the 2005 and 2009 CHIS questionnaires use the same phrasing.[117]

The final overall sample size was 93,634 (43,020 in 2005 and 47,614 in 2009).

Manuscript 1 (Chapter 3) included all individuals who self-identified as non-Hispanic white or Asian between 18 and 64 years. This subpopulation size for this analysis was 46,121 (38,555 non-Hispanic white and 7,566 Asian adults).

Manuscript 2 (Chapter 4) included all individuals who self-identified as Asian between 18 and 64 years. The subpopulation size for this analysis was 7,566 (1,918 Chinese, 882 Filipino, 467 Japanese, 1,138 Korean, 1,552 Vietnamese, 740 South Asian, and 869 Other Asian adults).

For Manuscript 3 (Chapter 5), one year of data (2009) were used based on recommendations from the CHIS Data Access Center. Pooling multiple years of data was not recommended when using Taylor series weights because the Taylor's series variance stratum was defined separately for different CHIS cycles. The subpopulation for this analysis included all self-identified Asians between 18 and 64 years (n=4,021). Due to sample size limitations, only Chinese (n=851), Korean (n=640), and Vietnamese (n=1,152) were used to assess differences by ethnicity.

Study Variables

Dependent variable

The dependent variable of interest was having a USC other than the emergency department (ER). The outcome was derived from the questions "Is there a place that you usually go to when you are sick or need advice about your health?" and "What kind of place do you go to most often—a medical doctor's office, a clinic or hospital clinic, an emergency room, or some other place?" Those who responded positively to the first question and specified ER in the second question were not considered to have a USC. All others who responded yes to the first question were considered to have a USC. Individuals who use the emergency department as their USC

cannot take advantage of the benefits of having a USC, such as better coordination and continuity of care.[118,119]

Independent variables

The independent variables of interest are based on the proposed conceptual framework and include key predisposing characteristics, key enabling factors, need, acculturation factors and other demographic/predisposing variables. Coding of variables was modified to best reflect the stated goals of the analysis. A list of the variables with descriptions and how they were coded for each analysis is presented in Appendix B.

Self-reported race/ethnicity of the respondent was the primary independent variable. Manuscript 1 (Chapter 3) categorized respondents as non-Hispanic white and Asian. Manuscript 2 (Chapter 4) included individuals who self-identified Asian race and Asian ethnicity (Chinese, Filipino, Japanese, Korean, Vietnamese, South Asian, and Other Asian). South Asians included individuals identified as Bangladeshi, Pakistani, Sri Lankan, and Asian Indian. Other Asians also included Southeast Asians, those who identified as Asian of 2 or more ethnicities and all other Asians who did not identify with a previously listed category. Manuscript 3 (Chapter 5) included all Asians and a subset of the ethnic subgroups (Chinese, Korean, and Vietnamese).

The key predisposing characteristic of interest was educational attainment. Educational attainment is defined as the highest level of education that the respondent reported as completed.

The key enabling resources were annual household income, employment status, and health insurance status. Household income was based on the US federal poverty level (FPL) which calculates percentage of FPL by income and the number of individuals in the household. For Manuscript 3 (Chapter 5), poverty level was used as a continuous variable and presented as a level times 100% FPL. The employment status variable indicated the current working status of the respondent - whether the respondent was employed and the type of employment that the

respondent was engaged. For the third manuscript (Chapter 5), employment status was created at the household level rather than the individual level. This variable combined working status information on the respondent and the respondent's spouse (if applicable) and used their highest level of working status. Health insurance reflects the respondent's current source of health insurance. For the third manuscript (Chapter 5), health insurance was dichotomized as insured and not insured.

Need was measured by the respondent's self-reported general health condition, or health status.

Acculturation factors included in the analysis were English language proficiency, length of residence in the US, and residence in a racially/ethnically concordant neighborhood. English language proficiency was an item asked of respondents who completed the survey in a language other than English or reported speaking a language other than English at home. The variable indicated the respondent's self-reported proficiency in English. English proficiency was measured as high (English only, very well, well) or low (not well, not at all) proficiency in Manuscripts 1 and 2 (Chapters 3 and 4), while all 5 categories were used in Manuscript 3 (Chapter 5). Length of residence combined information on where the respondent was born and the number of years lived in the US (if not US-born) to determine whether the individual was a recent (<5 years), mid-tenure (5-14 years), or long-tenure immigrant (15+ years). Residence in a concordant neighborhood was constructed by linking the 2010 U.S. Census Summary File 1 census tract-level population data to the respondents' census tract to determine the percentage of same race/ethnicity residents residing in the tract. For example, the census tract percentage of Chinese was linked to individuals identified as Chinese. The all Asians category linked respondents to their identified ethnicities. Census tracts were divided by prevalence using a cut point of 40%;[77,120] respondents living in areas of ≥40% race/ethnicity concordance were considered to be living in a neighborhood of high racial/ethnic concordance while those living in areas <40% lived

in a neighborhood of low to medium racial/ethnic concordance. Manuscript 1 (Chapter 3) assessed race concordance while Manuscripts 2 and 3 (Chapters 4 and 5) assessed ethnicity concordance.

Other demographic, predisposing variables included in all models were age, gender, marital status, household size, and survey year.

Statistical Analyses

All estimates and analyses were weighted using survey weights, provided by CHIS, to adjust for the complex survey design. Manuscripts 1 and 2 (Chapters 3 and 4) used jackknifed replicate weights while Manuscript 3 (Chapter 5) used Taylor series weights. All tests were assessed based on a significance level of $\alpha = 0.05$. Statistical analyses for Manuscripts 1 and 2 (Chapters 3 and 4) were conducted with Stata software (version 12.0; Stata Corporation, College Station, TX). Variable construction and descriptive statistical analyses for Manuscript 3 (Chapter 5) were conducted using Stata and path analysis was conducted using Mplus software (version 7.0; Muthén & Muthén, Los Angeles, CA).

Statistical Analysis for Manuscript 1 (Chapter 3)

Descriptive statistics were produced for non-Hispanic white and Asian respondents. The chi-square test was used to test for difference in the proportion of characteristics by race. Multiple logistic regression models were used to examine the independent associations of the key factors with having a USC. Two sets of models were constructed. The first set used the total sample population of non-Hispanic whites and Asians while the second set stratified by race.

Within each set of models, three hierarchical models were built to assess how the systematic inclusion of predisposing, enabling, and acculturation variables changed associations with having a USC. Model 1 included the key predisposing resource, educational attainment, and the demographic control variables. Model 2 added enabling resources, employment status,

insurance, and household income to Model 1. Finally, acculturation factors (language proficiency, length of residence, and residence in a racially concordant neighborhood) were added in Model 3. Since a log likelihood is not calculated with survey data, the standard goodness-of- fit tests (i.e., likelihood ratio test, AIC, BIC) could not be used to compare models. Instead, an adjusted Wald test, a test that approximates the likelihood ratio test, was used to test whether the parameters of the set of variables were simultaneously equal to zero.

Statistical Analysis for Manuscript 2 (Chapter 4)

Descriptive statistics of all variables were produced by Asian ethnic subgroup (Chinese, Filipino, Japanese, Korean, Vietnamese, South Asian, and Other Asian). The chi-square test was used to test for differences in the characteristics by ethnicity. Multiple logistic regression models were used to examine the independent associations of the key factors with having a USC. Pair-wise comparisons between the ethnic subgroups were calculated using linear combinations and the Wald test after the full logistic regression model was run to examine how Asian ethnic subgroups varied in having a USC. Stratified multiple logistic regression models were conducted to examine Asian race- and ethnicity-specific associations for all Asians, Chinese, Filipino, Japanese, Korean, Vietnamese, and South Asians.

Statistical Analysis for Manuscript 3 (Chapter 5)

Descriptive statistics of all variables were produced for all Asians and by Asian ethnic subgroup (Chinese, Korean, and Vietnamese). The Wald test was used to test for differences in characteristics by ethnicity.

To examine the direct and indirect effects of the predisposing, enabling, and acculturation factors on having a USC, path analysis was conducted. Path analysis is the structural equation model used for observed variables and allows for specification of the relationship between variables.[121] Using theory and previous research, path analyses test hypothesized linear

relationships between observed variables.[122] Path analysis is an extension of multiple regression that allows the researcher to simultaneously model several related regression equations, therefore a variable could be a dependent variable in one equation of the model and an independent variable in another equation.[123]

The hypothesized Andersen health behavioral path diagram estimated is presented in Figure 2.1 and Table 2.1. The model represents the hypothesized direct and indirect relationships of the predisposing, enabling, and need factors to having a USC. Not all relationships were explicitly indicated, arrows that point between dashed boxes indicated that all variables in the dashed box were hypothesized to have a direct effect in the direction of the single arrow. Gender, marital status, and age were added as covariates to the model. Their hypothesized relationships within the path model are summarized in Table 2.1.

Model parameters were estimated using the weighted least squares mean variance (WLSMV) available in Mplus. WLSMV is a weighted least squares estimation with degrees of freedom adjusted for means and variance of latent and observed variables; it is used when binary or ordered categorical observed dependent variables are included in the models.[123] Studies have shown the WSLMV estimator to provide accurate test statistics, parameter estimates, and standard errors under normal and non-normal latent response distributions across multiple sample sizes and types of models.[124] To account for the different types of dependent (mediating) variables in the model, Mplus uses probit regression for binary or ordered categorical dependent variables and linear regression for continuous variables. Dichotomous mediating variables were treated as underlying latent response variables while categorical variables are treated as continuous variables.[125] Both standardized and unstandardized estimates were presented. The standardized estimates allow for assessment of the relative magnitude of an association within a model and the unstandardized estimates are used to make comparisons across models.[121] Standardization of parameter estimates are based on the variable type of the covariate. Ordinal

and continuous covariates were standardized using the variances of the background and outcome variables for standardization (StdYX) while binary covariates were standardized using the variances of the continuous latent variables and the background and outcome variables (StdY).[125]

Several global goodness-of-fit test were used to assess the fit of the models since no consensus on the best fit statistic exists.[121,124,126] This analysis used model chi-square, root measure square error of approximation (RMSEA), Comparative Fit Index (CFI), and weighted root mean square residual (WRMR). The model chi-square test is the most commonly used model test statistic, where non-significant values ($p>0.05$) indicates a good fit while a significant chi-square indicates the lack of a good fit. However, the chi-square test is sensitive to large sample sizes and more complex models, and models are often rejected due to large sample size.[124] Therefore, other tests are needed to assess fit. The RMSEA is a parsimony or misfit measure that penalizes for the lack of parsimony, generating better fit for less complex models.[121] RMSEA values of less than or equal to 0.05 indicate good model fit. The CFI compares the existing model with a null model where the variables are uncorrelated. CFI values greater than or equal to 0.95 is considered a good fit. The WRMR is a variant of the residual-based model fit index that is appropriate for outcomes with non-normal distributions such as binary outcomes.[127] A WRMR value of less than 1.0 is considered good fit.

Multiple-group analyses were used to test whether the pathways to USC were the same across Chinese, Korean, and Vietnamese adults. Multiple-group analyses is a method of analysis used to investigate population heterogeneity by testing for equivalence of the parameters across different populations, or multigroup invariance.[125] In multiple-group analysis, the model simultaneously fits the data for the different populations to test whether the difference in parameters are statistically significant across populations.[127]

Several steps were needed to test for invariance among Chinese, Korean, and Vietnamese adults. First, the hypothesized Andersen health behavioral path model was used as the baseline

model. The baseline model leaves all path coefficients free to vary across the ethnic subgroups. Next, a restricted model where all of the paths were constrained to be equal across the groups was built.[127] When models are nested within each other, as in the case of the baseline and restricted models, the chi-square difference test is used to determine whether the 2 models are significantly different. If the chi-square difference test does not reveal a significant difference between the two models, then there is support that the models are invariant, or the same model can be applied across the different ethnicities. If the chi-square difference test reveals a significant difference between the two models, then this suggests that the models are not invariant and ethnicity moderates the pathways to having a USC.

Finally, to test the research question about the influence of acculturation factors on the USC pathways, the three acculturation measures (length of residence, English proficiency, and residence in an ethnically concordant neighborhood) were introduced into the model as a direct effect on having a USC and an indirect effect through employment. The acculturation factors were first added individually to test their individual associations and then together to test for a joint association. The Wald Test of Parameter Constraints was used to test the significance of including the acculturation factors. Mplus uses the product of the parameter estimates to calculate the indirect effects, the Delta method to calculate the standard errors, and the Sobel test to test the significance of the indirect effects.[125]

Ethics Review

The study was determined to be "Not Human Subjects Research" on November 8, 2011 by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board. The study was exempt from IRB review because it involved secondary data analysis of pre-existing, de-identified/delinked, public and not publicly available datasets and none of the study researchers were involved in the original data collection.

Unweighted Sample Counts

Unweighted sample sizes of the independent variables for the data is presented in Appendix C. The unweighted sample counts for 2005 and 2009 CHIS are presented by race and having a USC (Table C.1) and by race/ethnicity (Table C.2). Unweighted sample sizes of the independent variables for 2009 CHIS are also presented by having a USC (Table C.3) and by race/ethnicity (Table C.4). While no trends should be inferred from the unweighted sample counts, the cell counts provide an indication to when results may be less robust or underpowered for certain groups. Cells or variables with small sample sizes ($n<11$) were collapsed or removed from the analyses for Manuscript 2 (Chapter 4). Subgroups with several cells with small sample sizes (Filipinos, Japanese, and South Asians) were excluded from the analysis for Manuscript 3 (Chapter 5).

Figure 2.1. Path diagram of the hypothesized Andersen health behavioral model on having a usual source of care

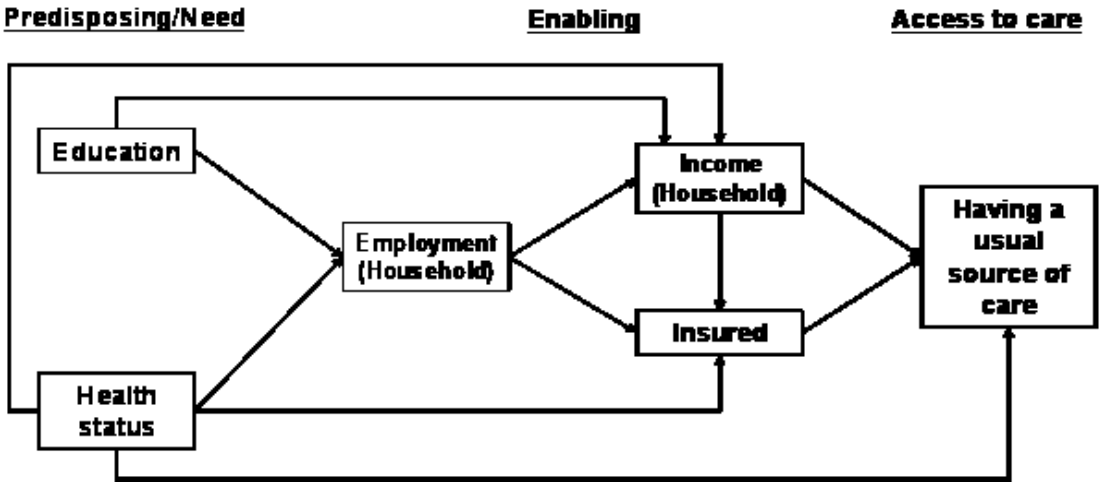


Table 2.1. Matrix of control variables for path analysis with main study variables

Direct effects of covariates	Employment	Income	Insurance	USC
Age	X	X	X	
Marital status	X	X	X	
Gender	X	X		X

CHAPTER 3: MANUSCRIPT 1

"Effect of acculturation on variations in having a usual source of care in Asian Americans versus non-Hispanic whites in California"

Abstract

Objectives. Variations in having a usual source of care (USC) were examined among non-Hispanic white and Asian American adults in California.

Methods. Data were from the 2005 and 2009 California Health Interview Survey. Following a modified Anderson model, hierarchical logistic regression models were constructed to compare odds of USC between non-Hispanic white (n=38,554) and Asian adults (n=7,566) and to examine associations with acculturation factors (English proficiency, length of residence, and residence in a racially concordant neighborhood) and key enabling (employment, income, insurance) and predisposing (education) resources.

Results. Race-related disparities between Asian and non-Hispanic whites in USC were not significant after accounting for acculturation factors. Low English proficiency and short time in the US (<5 years) were significantly associated with USC in both groups. Greater education and insurance were not associated with having a USC among Asians.

Conclusions. Key differences exist in having a USC between Asian American and non-Hispanic white adults. Acculturation factors are key drivers of disparities and should be included in USC models with Asians. Insurance and education are differentially significant for Asians compared to non-Hispanic whites.

Effect of acculturation on variations in having a usual source of care in Asian Americans versus non-Hispanic whites in California

Introduction

Disparities in having a usual source of care (USC) have been persistently documented for Asian Americans. The 2012 National Health Disparities Report (NHDR) found that the prevalence of having a primary care provider to be 8% less for Asian Americans than non-Hispanic whites.[10] This disparity has considerable consequences since having a USC is a key indicator of equity in access to health care and is consistently associated with increased utilization of primary care services and health outcomes.[9,14,16,17] Asians are disproportionately burdened given their increased risk for easily preventable and chronic diseases.[82] As the fastest growing minority population in the United States,[128] understanding the determinants of health access for Asians needs to be prioritized in the national health agenda.[129]

Published literature reveals persistent disparities in access to care, specifically having a USC, between Asians and non-Hispanic whites.[37,39] However, few studies to date have explored what factors relate to this disparity, a prerequisite to understanding and resolving the determinants of this discrepancy in healthcare access. Much of the variation in health accessing behavior among immigrant populations has been attributed to linguistic barriers and the lack of familiarity and comfort with the American healthcare system.[43,45,48,53,57] Given the high concentration of immigrants within the Asian population (67% in 2011[130]), understanding receipt of USC requires examination of the psychosocial and cultural effects of immigration, or acculturation, on access.[48,51–55] Commonly used measures of acculturation are English language proficiency and length of residence.[45,73,131] Both of these measures have been shown to have a significant effect on access to care and have commonly been used in studies using survey data;[53,59,66,73] however, use of these measures alone cannot capture the complexity of the process of acculturation.[45,73,131]

Conceptualizations of acculturation recognize the importance of understanding how communities might influence health and access to care.[61,73–75] Health, health behaviors and acculturation may be positively or negatively influenced by the social, cultural and economic factors of where an individual lives. Ethnic neighborhoods (communities with a high proportion of ethnic minorities) provide cultural goods and social ties that may alter an individual's time to adaptation to a new culture and may serve as a primary resource of health knowledge for immigrants and individuals of low acculturation.[73,74,76] Due to the low number of Asian neighborhoods in the US, there is a lack of national-level research on the impact of ethnic neighborhoods on Asian access.[75] Findings among Latino populations, which also have a large percentage of immigrants, suggest that ethnic neighborhoods may be an important determinant of access to care for Asians, as access to social networks may promote health services use.[75,77] While previous research has largely focused on personal measures of acculturation, this study also examines the environmental influences of acculturation to more fully understand its effect on having a USC.

Relationships between the commonly-used determinants of access conceptualized in the Aday and Andersen's behavioral model of health services utilization and access, such as socioeconomic status (SES) and access to care have not been well established in Asians.[90,104] Although Asians are generally categorized as a group with high socioeconomic status, including education, income, and employment, and health insurance, Asians also have higher rates of poverty, unemployment, and uninsurance than non-Hispanic whites.[2,80,81] This polarity within the race may be due to the wide variety in ethnicities, cultures, and immigration patterns to the US.[48,53] Although health insurance is clearly a significant determinant of access among all Asians,[63,83–85] the associations between access to care and education, income and employment for Asians are unclear.[44,45,63,83–85,87,88]

The lack of research and its clarity on access to care for Asian adults suggests that better understanding of the associations among having a USC, acculturation factors, and the predisposing and enabling resource for Asians is needed. In particular, due to the unique barriers and characteristics of the Asian population, extension of the Anderson and Aday model should be tested to understand how acculturation factors (English proficiency, length of residence, and residence in an ethnic neighborhood) are associated with having a USC. This study uses aggregated data from the 2005 and 2009 California Health Interview Survey (CHIS), a representative, statewide survey that collects detailed ethnicity and demographic information in a state where 33% of the Asian population in the United States resided in 2010.[132] This study aimed to (1) determine whether Asian adults were less likely to have a USC compared to non-Hispanic adults, after controlling for acculturation and key predisposing and enabling resources, and (2) examine how acculturation and key predisposing and enabling resources differentially influence having a USC in non-Hispanic white and Asian adults.

Methods

Data

Data used for this study are from the 2005 and 2009 California Health Interview Survey (CHIS). The CHIS is a cross-sectional random-digit-dial telephone survey that represents the non-institutionalized population in California. It is the largest statewide survey in the nation and is conducted every 2 years. Two waves of CHIS data were aggregated to ensure statistical power. The 2007 data were not included due to concerns related to changes in phrasing prior to the question related to having a USC; the 2009 CHIS uses the original phrasing.[117] The CHIS samples all of California's major racial and ethnic groups and oversamples for several of the smaller ethnic groups by employing a multi-stage sample design and by conducting interviews in English, Spanish, Chinese (Mandarin and Cantonese dialects), Korean, and Vietnamese.[109,111] Inclusion of the Asian languages increased the representativeness of Asians in the survey.[133]

Comparable to other response rates of scientific surveys in California, the landline response rates were 26.9% and 15.6% for 2005 and 2009.[112,113] All variables used were imputed by CHIS to improve the analytic usability of the data.[109]

Respondents

The sample for this analysis was restricted to adults between 18 and 64 years who were identified as non-Hispanic white or Asian. Children and elderly adults were excluded because they have been shown to have different health accessing behaviors. Two waves of CHIS data were aggregated to yield increased statistical power to examine characteristics in Asians. The total, unweighted sample included 46,121 adults (38,555 non-Hispanic whites and 7,566 Asians).

Dependent Variable

The dichotomous dependent variable was having a USC other than the emergency room (ER). The outcome was derived from the questions "Is there a place that you usually go to when you are sick or need advice about your health?" and "What kind of place do you go to most often—a medical doctor's office, a clinic or hospital clinic, an emergency room, or some other place?" Those who responded positively to the first question and specified ER in the second question were considered to lack a USC.

Independent variables

The main independent variable was self-reported race. Individuals were classified as non-Hispanic white or Asian. Using a modified version of the Aday and Andersen's behavioral model of health services utilization and access,[90,104,106] key variables were categorized as predisposing, enabling, and acculturation factors.

The key predisposing resource of interest was educational attainment. Educational attainment was categorized as less than high school, high school graduate or GED, some college, college graduate, or graduate degree.

The key enabling resources were household income, employment status and health insurance status. Household income was calculated by CHIS and adjusted by household size; this was categorized into four income groups: <100% of the federal poverty level (FPL), 100% to 199%, 200% to 299%, or ≥300%. Employment status was classified as unemployed, self-employed, employed (other than self-employed), or not in labor force. Health insurance status was indicated as employment-based, other private, Medicaid/Medi-Cal, other public insurance, and uninsured.

Acculturation was assessed on the basis of self-reported English language proficiency, length of residence, and residence in a racially concordant neighborhood. English proficiency was categorized as high proficiency (English only, very well, well) or low proficiency (not well, not at all). Length of residence included information on nativity and years in the US, categorized as US born, recent immigrant (<5 years), mid-tenure immigrant (5-14 years), or long-tenure immigrant (≥15 years). Residence in a racially concordant neighborhood was constructed by linking 2010 U.S. Census Summary File 1 census tract-level population information to the census tract of individual respondents to determine the percentage of same race residents in the tract. Respondents in areas with ≥40% race concordance were coded as living in high race concordant neighborhoods while those living in areas <40% were in low to medium race concordant neighborhoods.[77]

All models included the following demographic factors: age, gender, marital status, household size, health status, and survey year.

Statistical Analyses

The χ^2 test was used to test for differences in characteristics between non-Hispanic whites and Asians. Multiple logistic regression models were used to examine the independent associations of the key predisposing, enabling, and acculturation factors on having a USC. Two sets of logistic regression models were constructed to examine variations in having a USC. The first set included the total sample to directly compare non-Hispanic whites and Asians, with whites as the reference group. The second set stratified the data by race so that race-specific associations could be assessed.

Within each set of models, three hierarchical models were built to assess how systematic inclusion of predisposing, enabling, and acculturation covariates changed associations. In Model 1, the predisposing resource—educational attainment—and demographic factors were included. In Model 2, the enabling resources—employment status, insurance, and household income—were added. In Model 3, the acculturation factors—language proficiency, length of residence, and residence in a racially concordant neighborhood—were included.

All estimates and analyses were weighted using survey weights, provided by CHIS, to adjust for the complex survey design. All tests were assessed based on a significance level of $\alpha = 0.05$. Statistical analyses were conducted with Stata software (version 12.0; Stata Corporation, College Station, TX).

Results

Sample characteristics

The weighted descriptive characteristics of Asian and non-Hispanic white adults in California are presented in Table 3.1. Statistically significant differences were found by race for most descriptive characteristics ($p<0.05$). In general, Asians were more likely to be female, younger, of poorer health, and reside in larger households than non-Hispanic whites. No difference in marital status was observed.

[Table 3.1 about here]

The unadjusted distribution of predisposing, enabling, and acculturation factors for Asian and non-Hispanic white adults are presented in Table 3.2. All associations by race were statistically significant. Asians had both higher and lower levels of educational attainment with approximately 54% with at least a college degree and 8% without a high school diploma compared to 44% and 4%, respectively, among non-Hispanic whites. Although non-Hispanic whites and Asians had similar percentages of employment (75% vs. 73%, respectively), Asians had a higher percentage of uninsured (16% vs. 11%) and higher percentage adults below 200% of FPL (27% vs. 15%). In regards to the acculturation factors, 18% of Asians had low English proficiency and more than 70% were immigrants. Non-Hispanic whites were more than two times as likely to live in a race-concordant neighborhood as Asian Americans (76% vs. 30%). Non-Hispanic white adults were also more likely to have a USC compared to Asians (88% vs. 83%).

[Table 3.2 about here]

Disparities in having a usual source of care by race

Table 3.3 presents the association between race and USC from the hierarchical logistic regression models. Asians had lower odds of having a USC compared to non-Hispanic whites in all models. This disparity was observed in the crude model and persisted across the traditional predisposing and enabling characteristics (Models 1 and 2) but was no longer significant after inclusion of the acculturation factors (Model 3). The magnitude of the disparity also decreased as more explanatory factors were included. In the crude model with only USC and race, the odds of having a USC was 37% lower for Asians than non-Hispanic whites ($p<0.001$). In Model 1 with the key predisposing resource (educational attainment) and demographic factors, the odds of having a USC was 31% lower for Asians than non-Hispanic whites. After further adjustment with enabling resources (employment status, insurance status, and household income) in Model 2,

Asians still had 24% lower odds of having a USC (p=0.003). In Model 3, all key resources and acculturation factors (English proficiency, length of residence, and residence in a racially concordant neighborhood) were included and Asians had 23% lower odds of having a USC, but this association was no longer statistically significant (p=0.060).

[Table 3.3 about here]

Associations with predisposing and enabling resources

The magnitude and significance of the associations that key predisposing and enabling resources have with having a USC varied in stratified analyses for non-Hispanic white and Asian adults (Table 3.4). Almost all levels of educational attainment were associated significantly with having a USC for both non-Hispanic whites and Asians (Model 1). After adjusting for key enabling resources (Model 2), only non-Hispanic white adults with less than a high school degree had lower odds of having a USC compared to non-Hispanic white adults with some graduate school or more (OR=0.74, p=0.04). Among Asian adults, all educational levels, except those with less than a high school diploma, had 41-51% lower odds of having a USC when compared to some graduate school or more. Addition of the enabling resources revealed more differences in associations with having a USC (Model 2). Compared to those who were employed within their respective races, non-Hispanic whites not in the labor force had 25% greater odds of having a USC while Asian adults who were self-employed had two times greater odds. Compared to adults who had employment-based health insurance, non-Hispanic white adults with other private, Medicaid/Medi-Cal and no insurance had lower odds of having a USC (OR=0.64, 0.50, 0.11, respectively, all $p<0.01$); Asian adults with other private (OR=0.59, $p<0.05$) and no insurance (OR=0.14, $p<0.01$) also had significantly lower odds of having a USC. Compared to adults whose household incomes were 300% or higher than FPL, non-Hispanic whites with household income <100% FPL and 100-199% FPL had 34% and 39%, respectively, lower odds of having a USC

while only Asians with an income between 100-199% had lower odds of having a USC (OR=0.70, p=0.03).

[Table 3.4 about here]

Associations with acculturation factors

Addition of the acculturation factors exposed both similarities and differences in the models for Asians and non-Hispanic whites (Model 3). In both the non-Hispanic whites and Asians, adults with low English proficiency had 53% and 42%, respectively, lower odds of having a USC compared to adults with high English proficiency. Non-Hispanic white and Asian immigrants in the US for less than 5 years also had significantly lower odds of having a USC when compared with adults who were born in the US. Living in a race concordant neighborhood was not significantly associated with having a USC for either non-Hispanic whites or Asians.

There were also small but notable changes in the statistical significance of the enabling resources in the Asian model after inclusion of the acculturation factors. Asian adults with other private insurance and household incomes between 100-199% FPL were no longer significantly different than their respective reference categories in having a USC. Thus, among Asian adults, there were no longer any significant differences in having a USC by household income while lower income non-Hispanic white adults still had significantly lower odds of having a USC compared to the highest income group. Within insurance categories, only uninsured Asian adults had significantly lower odds of having a USC compared to Asian adults with employment-based insurance while all insurance categories (except for other public) were significant among non-Hispanic white adults.

Discussion

Using a large, population-based survey, this study compared socioeconomic and acculturation factors associated with having a USC other than the ER for Asian American and

non-Hispanic white adults. The study made two important findings regarding having a USC in Asian adults. First, this study found that the acculturation factors are a key driver of the persistent disparity in having a USC. After adjusting for English proficiency, length of residence in the US, and residence in a racially concordant neighborhood, Asian adults were no longer significantly different than non-Hispanic white adults in having a USC. Second, different acculturation factors and key predisposing and enabling resources are important for understanding having a USC for non-Hispanic whites and for Asians. Key differences in associations with having a USC were found among the different categories of educational attainment, insurance status and household income. Low English proficiency and recent immigration were associated with significantly lower odds of having a USC for both races.

This study found that the systematic inclusion of acculturation factors is critical to understanding difference in possession of a USC between Asian Americans and non-Hispanic whites. This suggests that much of the differences in having a USC between Asian Americans and non-Hispanic whites may be explained by adjusting for the effects of immigration. Similarly, Kandula et al. found that after adjusting for acculturation factors (nativity, years in the US, speaking a language other than English at home), most Asian Americans ethnic groups were no longer significantly different than non-Hispanic whites in likelihood of having a cancer screening.[67] Like other studies that have examined the effects of length of residence and English proficiency[66,134] on access to care, the current study also found that adults with low English proficiency and have been in the US for a shorter duration have worse access to care. Frisbie et al. and Nugyen et al. found that Asian Americans who resided in the US for less than 10 years had lower odds of having a USC than US-born Asians while LeClere et al. found a similar association among immigrants and physician contacts.[48,49,52] Similarly, Ponce et al. found that older adults with low English proficiency had significantly higher odds of not having a USC compared to proficient older adults.[66] In addition, other research found that Spanish-speaking Hispanic adults

had much lower rates of having a personal doctor or USC than English-speaking Hispanic adults[135,136] and recent Mexican immigrants had less access to preventive services than longer-staying or US-born Mexicans.[137]

While English proficiency and length of residence are often related since English proficiency is generally expected to improve with more time spent in the US, these findings suggest that these variables represent two distinctly different barriers to health care access. Language barriers suggest underlying difficulties in communication and in finding necessary information while length of residence likely represents knowledge of the US healthcare system and other cultural norms.[45,67] Language barriers may persist for some immigrants regardless of the amount of time spent living in the US while other recent immigrants arrive fluent in English. Recent immigrants in the US for less than 5 years are especially vulnerable since 5 years must elapse for coverage eligibility into some health programs (i.e., Medicaid) and for U.S. citizenship.[48,138] Differences in these barriers suggest that unique policy interventions are necessary to address the disparities in access to care.

Contrary to expectations, living in a neighborhood with 40% or more of the same race was not found to be significantly associated with having a USC. Research using Latino and black populations have found significant associations between living in a racially concordant neighborhood with access to care.[75,77,139] However, the effect on having a USC using a general Asian race composition indicator may be diminished if multiple Asian ethnicities live in the same neighborhood due to the lack the cultural and language concordance between ethnic subgroups. Previous research on Asian Americans has found that the effects of living in an ethnic neighborhood vary by Asian ethnic group.[78,79] More research may be needed to better measure the concept of ethnic neighborhoods and to understand their effects on healthcare access in Asians.

By modeling Asians and non-Hispanic whites separately, this study was able to tease out the differential associations of key predisposing and enabling factors with having a USC. A

regressive, but largely non-significant, gradient in educational attainment was observed among non-Hispanic whites and not observed among Asians. Instead, lower odds of having a USC persisted across almost all of the education levels in Asians, except for those with less than high school. This suggests that higher levels of educational attainment do not eliminate or reduce barriers to access for Asians as it does for non-Hispanic whites. Asians with no high school diploma may have similar access as those with some graduate school because many of these adults may be recipients of public programs or interventions (70% of Asian adults with no high school diploma had an income of <200% FPL compared to 43% of comparable non-Hispanic whites, data not shown). Previous studies clearly show that having any insurance is a significant factor in access for Asians,[45,46,63,83,84] while this study used more nuanced categorization and found that insurance appears to play a different role in having a USC for non-Hispanic whites than Asians. Only uninsured Asian adults had significantly lower odds of having a USC compared to those with employment-based insurance; almost all categories of insurance had significantly lower odds of USC among non-Hispanic whites. It was also unexpected to find that self-employed Asians had higher odds of having a USC. While this result diverges from other studies that have found the self-employed to have more limited health insurance and utilization,[63,83,140] Perry and Rosen found that though the self-employed had less health insurance, they had the same rates of utilization as wage-earners.[141] The authors also hypothesize that self-employed individuals may have more flexibility in their schedules and lower opportunity costs of time (i.e., foregone wages) associated with accessing care. Finally, the regressive trend in having a USC as household income decreased among non-Hispanic whites was not observed among Asians. The lack of significance in household income among Asians has been observed in other studies and suggests that other factors, such as state and federal policies or interventions that target low-income groups, may alter the association between income and having a USC for Asians.[49,63,78,142] In-depth assessment of education, income, employment, and insurance have determined that distinct differences exist in how these factors are associated with having a USC

for non-Hispanic whites compared with Asians. Further research is needed to establish the relationship, but some of the variation found may be due to the stark differences in Asian ethnicities. Due to the heterogeneous cultures, histories and languages among Asians, it will be important to examine how Asian ethnicities vary by the key predisposing and enabling factors so the effect of specific health practices and beliefs on differential patterns in access to health care may be better understood.[45,46,63,67]

There are several limitations to this study. First, the findings of this study may not be generalizable to United States. California has the highest proportion of Asian and foreign-born residents (13.1% and 27.2% in California vs. 4.8% and 12.9% in the US) and its healthcare system may be more adapted to serve this population which may result in an underestimation of the odds of low access to care.[7] However, percentages of Asian and non-Hispanic white adults who have a USC in this study (82.5% and 88.2%, respectively) are similar to published national percentages (83% and 86%, respectively).[42] Also, when comparing health coverage rates in the CHIS and the National Latino and Asian American Study, most overall estimates were within 5%.[143] This suggests that although California data should not inform the policy of other states, these results can provide valuable insights into access to care among Asians. Second, the survey is not available in all native Asian languages (i.e., Tagalog), therefore respondents from ethnicities without translated surveys may be more educated and fluent in English which may result in underestimation of the odds of low access to care for the actual Asian population. Third, response rates may be very low among illegal immigrants and may also results in an underestimation of the odds of low access to care. However, despite these limitations, the CHIS is the best available survey to examine Asians because it oversamples on Asians and provides the survey in several languages native to Asians, resulting in a less biased sample.

The major contribution of this study was the assessment of how the disparity in having a USC between Asian and non-Hispanic white adults was affected by the systematic inclusion of

acculturation factors and key predisposing and enabling resources. This study found that after adding the acculturation factors (English proficiency, length of stay in the US, and residence in a racially concordant neighborhood), there was no longer a statistically significant disparity in having a USC between Asian and non-Hispanic white adults. These findings indicate that studies assessing access to care among Asian Americans and other immigrant populations must incorporate measures of acculturation to account for the effects of immigration since these factors help explain much of the disparities observed. This study also determined that educational attainment and insurance status were not as strongly associated with having a USC among Asians as among non-Hispanic whites. In fact, higher educational attainment was not associated with better access and only the lack of insurance was significantly associated with not having a USC among Asians. Low English proficiency and recent immigration were significantly associated with not having a USC in both groups. Policymakers should be cautious with assumptions about Asians based on conclusions drawn from non-Hispanic whites; highly educated Asian American adults may not have good access to care because individuals educated outside of the US may not be able to find comparable work and subsequent employer-based insurance in the US.

This study confirms the importance of inclusion of acculturation factors when assessing having a usual source of care and verifies that the key factors of having a usual source of care differ between Asian American and non-Hispanic adults in California.

Table 3.1. Descriptive characteristics of non-Hispanic white and Asian adults (18-64 years), California Health Interview Survey, 2005 and 2009

	Non-Hispanic White, % (95% CI)	Asian, % (95% CI)	p[a]
N	38,555	7,566	
Gender			<0.01
Male	50.1 (50.1-50.1)	47.1 (46.6-47.6)	
Female	49.9 (49.9-49.9)	52.9 (52.4-53.4)	
Age			<0.01
18-24 years	12.3 (11.7-12.9)	17.6 (16.1-19.3)	
25-34 years	17.3 (16.6-18.1)	24.5 (22.7-26.4)	
35-44 years	22.5 (21.8-23.1)	24.8 (23.2-26.5)	
45-54 years	25.9 (25.3-26.5)	20.3 (18.9-21.7)	
55-64 years	22.0 (21.6-22.4)	12.8 (11.8-13.8)	
Marital status			0.61
Married	58.2 (57.4-59.0)	58.8 (56.7-60.8)	
Not married	41.8 (41.0-42.6)	41.2 (39.2-43.3)	
Health status			<0.01
Excellent/Very good/Good	89.7 (89.2-90.2)	85.0 (83.5-86.3)	
Fair/Poor	10.3 (9.8-10.8)	15.0 (13.7-16.5)	
Household size			<0.01
1 person	12.8 (12.3-13.3)	6.8 (5.9-7.8)	
2 persons	31.5 (30.8-32.3)	19.9 (18.2-21.7)	
3 persons	21.5 (20.8-22.3)	23.3 (21.6-25.1)	
4 persons	21.0 (20.3-21.6)	26.3 (24.6-28.1)	
5+ persons	13.1 (12.5-13.8)	23.8 (21.7-25.9)	

Note: CI=confidence interval. Sample sizes are unweighted. All percentages are weighted.

[a] χ^2 test of the overall association between race and each characteristic.

Table 3.2. Predisposing, enabling, and acculturation characteristics of non-Hispanic white and Asian adults (18-64 years), California Health Interview Survey, 2005 and 2009

	Non-Hispanic White, % (95% CI)	Asian, % (95% CI)	p[a]
Predisposing			
Educational attainment			<0.01
Some graduate school or more	17.9 (17.3-18.4)	19.7 (18.3-21.1)	
College degree	26.9 (26.2-27.6)	34.6 (32.7-36.6)	
Some college/AA/vocational school	27.6 (26.8-28.4)	18.2 (16.6-19.9)	
High school graduate/GED	23.6 (23.1-24.2)	19.9 (18.4-21.4)	
Less than high school	4.0 (3.6-4.3)	7.6 (6.3-9.1)	
Enabling			
Employment status			<0.01
Employed	61.8 (61.0-62.6)	64.1 (62.1-66.1)	
Self-employed	13.9 (13.3-14.5)	9.2 (7.9-10.5)	
Unemployed	5.1 (4.5-5.8)	6.2 (5.1-7.6)	
Not in labor force	19.2 (18.6-19.8)	20.5 (19.1-21.9)	
Insurance status			<0.01
Employment-based	69.1 (68.3-70.0)	64.0 (61.7-66.3)	
Other private	10.0 (9.4-10.6)	9.2 (7.9-10.6)	
Medi-Cal (Medicaid)	5.8 (5.4-6.2)	8.1 (7.2-9.2)	
Other public	3.7 (3.4-4.0)	2.7 (2.0-3.5)	
Uninsured	11.4 (10.7-12.2)	16.0 (14.4-17.8)	
Household income			<0.01
<100 % FPL	5.9 (5.3-6.5)	11.0 (9.5-12.8)	
100-199% FPL	9.5 (9.0-10.1)	15.5 (14.0-17.2)	
200-299% FPL	11.4 (10.8-12.1)	13.1 (11.7-14.6)	
300%+ FPL	73.1 (72.3-74.0)	60.4 (58.2-62.5)	
Acculturation			
English proficiency[b]			
High	99.7 (99.7-99.8)	82.1 (80.7-83.4)	<0.01
Low	0.3 (0.2-0.3)	17.9 (16.6-19.3)	
Length of residence in the US[c]			<0.01
US born	90.9 (90.2-91.4)	28.4 (26.5-30.4)	
Recent immigrant	0.9 (0.7-1.2)	8.0 (6.8-9.2)	
Mid-tenure immigrant	2.0 (1.8-2.3)	21.5 (19.7-23.4)	
Long-tenure immigrant	6.2 (5.7-6.7)	42.1 (40.0-44.2)	
Lives in race concordant census tract[d]			<0.01
No	24.1 (23.3-24.9)	71.6 (69.4-73.7)	
Yes	75.9 (75.1-76.7)	28.4 (26.3-30.6)	
Having a usual source of care other than ER			<0.01
No	11.8 (11.1-12.5)	17.5 (15.7-19.5)	
Yes	88.2 (87.5-88.9)	82.5 (80.5-84.3)	

Note: CI=Confidence interval; AA=Associate in Arts degree; GED=General Educational Development; ER=emergency room. All percentages are weighted.

[a] χ^2 test of the overall association between race and each characteristic.

[b] High English proficiency responses included English only, very well/well and low English proficiency responses included not well/poor.

[c] Recent immigrants have been in the US for <5 years, mid-tenure immigrants have been in the US for 5-14 years, and long-tenure immigrants have been in the US for ≥15 years.

[d] Census tracts were classified as race concordant if the percentage of the corresponding race within the resident census tract was ≥40%.

Table 3.3. Association between Race and Having a Usual Source of Care other than the Emergency Room, California Health Interview Survey, 2005 and 2009

	Crude, OR (se, p)	Model 1, OR (se, p)[a]	Model 2, OR (se, p)[b]	Model 3, OR (se, p)[c]
Race				
Non-Hispanic White	--	--	--	--
Asian	0.63 (0.05, p<0.001)	0.69 (0.06, p<0.001)	0.76 (0.07, p=0.003)	0.77 (0.10, p=0.060)

Notes: OR=odds ratio; se=standard error; p=p-value.
[a] Model 1 adjusts for educational attainment, age, gender, marital status, household size, health status, and survey year.
[b] Model 2 adjusts for educational attainment, employment status, insurance, household income, age, gender, marital status, household size, health status, and survey year.
[c] Model 3 adjusts for educational attainment, employment status, insurance, household income, language proficiency, length of residence, residence in a racially concordant neighborhood, age, gender, marital status, household size, health status, and survey year.

Table 3.4. Associations between Predisposing, Enabling, and Acculturation Resources with having a Usual Source of Care other than the Emergency Room, California Health Interview Survey, 2005 and 2009

	Model 1, OR (se)[a]		Model 2, OR (se)[b]		Model 3, OR (se)[c]	
	Non-Hispanic white	Asian	Non-Hispanic white	Asian	Non-Hispanic white	Asian
Predisposing Resources						
Educational attainment						
Some graduate school or more	--	--	--	--	--	--
College degree	0.80 (0.08)†	0.49 (0.11)‡	0.87 (0.09)	0.56 (0.13)†	0.86 (0.09)	0.56 (0.13)†
Some college/AA/vocational school	0.82 (0.09)	0.40 (0.08)‡	1.24 (0.14)	0.49 (0.10)‡	1.20 (0.14)	0.47 (0.10)‡
High school graduate/GED	0.56 (0.06)‡	0.37 (0.09)‡	0.92 (0.10)	0.59 (0.14)†	0.89 (0.10)	0.59 (0.15)†
Less than high school	0.40 (0.06)‡	0.39 (0.12)‡	0.74 (0.10)†	0.94 (0.34)	0.72 (0.10)†	1.07 (0.39)
Enabling Resources						
Employment status						
Employed			--	--	--	--
Self-employed			0.89 (0.09)	2.08 (0.59)†	0.90 (0.09)	2.12 (0.63)†
Unemployed			0.99 (0.16)	0.62 (0.17)	1.00 (0.16)	0.66 (0.18)
Not in labor force			1.25 (0.10)‡	0.90 (0.16)	1.26 (0.11)‡	1.01 (0.18)
Insurance						
Employment-based			--	--	--	--
Other private			0.64 (0.07)‡	0.59 (0.15)†	0.64 (0.07)‡	0.63 (0.15)
Medi-Cal (Medicaid)			0.50 (0.07)‡	0.71 (0.19)	0.51 (0.07)‡	0.82 (0.22)
Other public			0.90 (0.15)	0.91 (0.41)	0.91 (0.15)	0.92 (0.42)
Uninsured			0.11 (0.01)‡	0.14 (0.02)‡	0.11 (0.01)‡	0.15 (0.03)‡
Household income						
300%+ FPL			--	--	--	--
200-299% FPL			0.85 (0.10)	0.96 (0.15)	0.86 (0.10)	1.01 (0.17)
100-199% FPL			0.66 (0.08)‡	0.70 (0.11)†	0.66 (0.08)‡	0.77 (0.13)
<100 % FPL			0.61 (0.09)‡	0.83 (0.20)	0.60 (0.09)‡	0.96 (0.24)
Acculturation Factors						
English proficiency[d]						
High					--	--
Low					0.47 (0.18)†	0.58 (0.12)‡
Length of residence in the US[e]						
US born					--	--
Recent immigrant					0.32 (0.07)‡	0.57 (0.15)†
Mid-tenure immigrant					0.97 (0.18)	1.22 (0.28)
Long-tenure immigrant					1.24 (0.24)	1.37 (0.31)
Lives in race concordant neighborhood[f]						
No					--	--

	Model 1, OR (se)[a]		Model 2, OR (se)[b]		Model 3, OR (se)[c]	
	Non-Hispanic white	Asian	Non-Hispanic white	Asian	Non-Hispanic white	Asian
Yes					0.91 (0.08)	1.00 (0.19)
Demographic Factors						
Age						
18-24 years	--	--	--	--	--	--
25-34 years	0.85 (0.10)	0.69 (0.16)	0.98 (0.12)	0.63 (0.15)	0.98 (0.12)	0.61 (0.16)
35-44 years	1.46 (0.18)‡	1.32 (0.30)	1.77 (0.22)‡	1.17 (0.31)	1.72 (0.21)‡	1.07 (0.29)
45-54 years	1.90 (0.24)‡	1.44 (0.31)	2.18 (0.28)‡	1.26 (0.29)	2.10 (0.27)‡	1.19 (0.29)
55-64 years	3.04 (0.43)‡	2.41 (0.57)‡	3.31 (0.47)‡	2.23 (0.56)‡	3.13 (0.45)‡	1.94 (0.56)†
Gender						
Male	--	--	--	--	--	--
Female	2.00 (0.13)‡	1.90 (0.25)‡	1.88 (0.13)‡	1.92 (0.28)‡	1.90 (0.13)‡	2.05 (0.30)‡
Marital status						
Married	--	--	--	--	--	--
Not married	0.36 (0.03)‡	0.58 (0.10)‡	0.61 (0.05)‡	0.65 (0.13)‡	0.60 (0.05)‡	0.56 (0.12)‡
Household size						
1 person	--	--	--	--	--	--
2 persons	1.02 (0.11)	0.91 (0.27)	1.10 (0.13)	0.81 (0.23)	1.10 (0.13)	0.76 (0.20)
3 persons	0.96 (0.11)	0.83 (0.27)	0.98 (0.12)	0.87 (0.28)	0.97 (0.11)	0.79 (0.25)
4 persons	1.21 (0.15)	1.12 (0.35)	1.31 (0.17)†	1.14 (0.35)	1.28 (0.16)	1.02 (0.30)
5+ persons	0.95 (0.13)	0.74 (0.27)	1.15 (0.16)	0.66 (0.23)	1.13 (0.15)	0.60 (0.21)
Health status						
Excellent/Very good/Good	--	--	--	--	--	--
Fair/Poor	0.91 (0.09)	0.70 (0.10)†	1.13 (0.14)	0.83 (0.13)	1.12 (0.14)	0.90 (0.16)
Survey year						
2005	--	--	--	--	--	--
2009	0.78 (0.06)‡	0.65 (0.08)‡	0.88 (0.07)	0.62 (0.08)‡	0.87 (0.06)	0.60 (0.08)‡

Notes: OR=odds ratio; se=standard error.

‡ P<0.01

† P<0.05

[a] Model 1 adjusts for educational attainment, age, gender, marital status, household size, health status, and survey year.

[b] Model 2 adjusts for educational attainment, employment status, insurance, and household income, age, gender, marital status, household size, health status, and survey year.

[c] Model 3 adjusts for educational attainment, employment status, insurance, and household income, language proficiency, length of residence, and residence in an ethnically concordant neighborhood, age, gender, marital status, household size, health status, and survey year.

[d] High English proficiency responses included English only, very well/well and low English proficiency responses included not well/poor.

[e] Recent immigrants have been in the US for <5 years, mid-tenure immigrants have been in the US for 5-14 years, and long-tenure immigrants have been in the US for ≥15 years.

[f] Census tracts were classified as race concordant if the percentage of the corresponding race within the resident census tract was ≥40%.

CHAPTER 4: MANUSCRIPT 2

"Factors of usual source of care among Asian American ethnic adults in California"

Abstract

Objectives. We examined whether factors associated with having a usual source of care (USC) differ among Asian American ethnic adults (all Asians, Chinese, Filipinos, Japanese, Koreans, Vietnamese, South Asians).

Methods. Data were from 2005 and 2009 California Health Interview Survey. Logistic regressions and pair-wise comparisons were used to compare odds of having a USC among Asian ethnic adults (18-64 years) and to examine race/ethnicity-specific associations with acculturation factors (English proficiency, length of residence, and residence in a racially concordant neighborhood) and key enabling (employment, income, insurance) and predisposing (education) resources.

Results. Significant differences in the magnitude of the disparity and factors influencing having a USC were found across Asian ethnicities. Korean and Japanese adults had 52% to 65% lower adjusted odds of having a USC compared with Chinese. Among all Asian ethnicities, uninsured adults had 85-94% lower adjusted odds of having a USC. Patterns of associations with USC and key factors varied by specific Asian ethnicity.

Conclusions. Patterns of associations for USC varied by Asian ethnicity. Targeted, ethnicity-specific policies and outreach are needed to improve access to care for Asian Americans.

Factors of usual source of care among Asian American ethnic adults in California

Introduction

Having a usual source of care (USC) is defined as having a health care provider whom a person usually goes to when they are sick or in need of medical advice and is a key component of access to care. It is an especially important health access measure for Asian Americans because of their higher risk for several easily detectable diseases and for common chronic diseases such as diabetes, heart disease, and some cancers that would benefit from better care coordination and follow-up.[31,144,145] Disparities in having a USC, have been well documented for Asian Americans; the percentage of Asians who have a usual primary care provider has been persistently lower compared to Whites (69.4% compared to 77.2%, respectively, in 2007).[26] Due to the projected population increase of 135% from approximately 14 million persons in the United States in 2010 (67% of which are foreign born) to more than 33 million persons by 2050,[1] understanding the likelihood of having a USC is especially important among Asian Americans.

Given the diversity of ethnicities, cultures and migration histories, several researchers have challenged the appropriateness of grouping Asians as a single race group and encouraged use of disaggregate Asian ethnic subgroups to understand subgroup differences.[40,41,46] In fact, the few studies focusing on the morbidity of Asian ethnic subgroups have found distinct heterogeneity among ethnicities.[31,42,144,145] For example, Asians as a whole have elevated age-adjusted rates of stomach cancer compared to non-Hispanic whites (20.1 versus 9.5 per 100,000); this rate ranges from 7.2 among the Filipino to 54.5 among the Koreans.[31] Likewise, age-adjusted results from the 2004-2006 National Health Interview Survey (NHIS) indicate stark variations across access to care indicators.[42] For example, the prevalence of Asian American adults who lack a usual place for health care ranges from 12% among the Japanese and 25% among the Koreans compared to 13% among non-Hispanic white adults.

Most previous studies reporting significant differences in access to care between Asian ethnic subgroups have examined access to care for special subpopulations such as children or for condition-specific outcomes like cancer screening among women.[43–48] Little is known about having a USC for general Asian adult populations much less for different ethnic groups. Only three studies to examine USC among multiple Asian subgroups were found. The first relied on 1993-1995 NHIS and found that Korean Americans have 90% higher odds and Filipinos to have 42% lower odds of not having a regular source of care compared to Japanese Americans,[48] and the second examined older Asian Americans to find that Vietnamese had higher odds of having a USC than Chinese.[49] The third study used 2003-2005 NHIS and found no difference in care access between the subgroups.[50] In addition, while many previous studies that focus on variations in care among Asians adjust for socioeconomic status (SES) and health coverage, clear relationships between access to care and key resources such as education, income and employment have not been established for Asians; few have closely examined how determinants vary with having a USC by specific Asian ethnicity.[44–46,57,63,67,83–85,108,131,146,147] Similarly, despite the high percentage of immigrants among Asian Americans, the effects of acculturation, or the process of cultural and psychological change that takes place as a result of contact between two or more cultural groups and their individual members,[55] have not been well addressed in the literature.

The objectives of the present study are (1) to determine whether the odds of having a usual USC will vary among Asian ethnic subgroups (Chinese, Filipinos, Japanese, Koreans, Vietnamese, and South Asians) after controlling for acculturation factors and predisposing and enabling resources, and (2) to examine whether factors influencing the odds of having a usual source of care vary by Asian ethnic subgroup. An understanding of distinct patterns of associations of having a USC with these factors will help in developing targeted interventions for specific Asian American ethnic subgroups.

Methods

Data for this study are from the 2005 and 2009 California Health Interview Survey (CHIS). The CHIS is a cross-sectional, random-digit-dial telephone survey conducted every 2 years that represents the non-institutionalized population in California. It is the largest statewide survey in the nation. The 2007 data were not included due to concerns related to changes in phrasing prior to the question related to having a USC; the 2009 CHIS uses the original phrasing.[117] The survey employs a multi-stage sample design and oversamples several of the smaller ethnic groups in California. Survey interviews are conducted in English, Spanish, Chinese (Mandarin and Cantonese dialects), Korean, and Vietnamese,[109,111] increasing the representativeness of Asians in the survey.[133] Comparable to other response rates of scientific surveys in California, landline response rates for 2005 and 2009 were 26.9% and 15.6%, respectively.[112,113] All variables used were imputed by CHIS to improve the analytic usability of the data.[109]

This study included adults between the ages of 18 and 64 years who self-identified as Asian. Elderly adults and children were excluded from the analysis because they have been shown to have different health needs and health accessing behaviors. Those identified as Asian were further specified by Asian ethnic subgroup: Chinese, Filipino, Japanese, Korean, Vietnamese, South Asian, and Other Asian. Two waves of the survey were combined to increase sample size and power for analysis of the Asian ethnic subgroups. The full sample used had 7,566 Asian adults, including 1,918 Chinese, 882 Filipino, 467 Japanese, 1,138 Korean, 1,552 Vietnamese, 740 South Asian, and 869 Other Asian adults.

Measures

The outcome of interest was having a usual source of care other than the emergency room (USC). Respondents were considered to have a USC if they answered affirmatively to the

question “Is there a place that you usually go to when you are sick or need advice about your health?” and did not specify emergency room to the follow-up question “What kind of place do you go to most often—a medical doctor's office, a clinic or hospital clinic, an emergency room, or some other place?”

The primary independent variable was self-reported race/ethnicity of the respondent. Individuals self-identified Asian race and Asian ethnicity (Chinese, Filipino, Japanese, Korean, Vietnamese, South Asian, and Other Asian). South Asians included individuals identified as Bangladeshi, Pakistani, Sri Lankan, and Asian Indian. Other Asians also included Southeast Asians and individuals identified as Asian of 2 or more ethnicities.

A modified Aday and Andersen’s behavioral model of health services utilization and access offers a useful framework for investigating Asian subgroup differences in having a USC. This model incorporates traditional predisposing, enabling and need factors used to explain access in any population as well as factors that are specific to minority populations.[90,104,106] For the largely immigrant, Asian population, modified models help distinguish how different histories of migration and adaption to the US affect access to care among the Asian ethnic subgroups.

Following a modified version of the Aday and Andersen’s model,[90,104,106] key variables were categorized as acculturation factors, predisposing resources, and enabling resources. Acculturation factors included in the analysis were English language proficiency, length of residence, and residence in a race/ethnicity concordant neighborhood. English language proficiency was self-reported and respondents were categorized as high proficiency (English only, very well/well) and low proficiency (not well/not at all). Length of residence combined nativity and duration in the US; respondents were classified as US born, recent immigrant (<5 years), mid-tenure immigrant (5-14 years), and long-tenure immigrant (≥15 years). Residence in a concordant neighborhood was constructed by linking the 2010 U.S. Census Summary File 1 census tract-level population data to the respondents’ census tract to determine the percentage of

same ethnicity residents residing in the tract. For example, the census tract percentage of Chinese was linked to individuals identified as Chinese. The all Asians category linked respondents to their identified ethnicities. Census tracts were divided by prevalence using a cut point of 40%;[77] respondents living in areas of ≥40% race/ethnicity concordance were considered to be living in an area of high prevalence while those living in areas <40% lived in an area of low prevalence.

The key predisposing resource was educational attainment, categorized as less than high school, high school graduate or GED, some college/vocational school, college graduate, or graduate degree. Key enabling resources were annual household income, employment status, and health insurance status. Household income was based on the US federal poverty level (FPL) which calculates percentage of FPL by income and the number of individuals in the household. The four income groups included: <100% of the federal poverty level (FPL), 100% to 199%, 200% to 299%, and ≥300%. Employment status was coded into 4 categories: employed (other than self-employed), self-employed, unemployed, and not in labor force. Health insurance status was categorized as employment-based, other private, Medicaid/Medi-Cal, other public insurance (i.e., Medicare, Tricare), and uninsured.

Other demographic, predisposing factors included in all models were age (18-24/25-34/35-44/45-54/55-64 years), gender (male or female), marital status (married or not married), household size (1/2/3/4/5+ persons), health status (excellent/very good/good or fair/poor), and survey year (2005 or 2009).

Statistical Analyses

Differences in characteristics among Asian ethnic subgroups were tested using the χ^2 test. Multiple logistic regression models were used to examine the independent associations of the key predisposing, enabling, and acculturation factors on the odds of having a USC. To examine whether Asian ethnic subgroups vary in having a USC, pair-wise comparisons between the

groups were calculated using linear combinations and the Wald test after the full logistic regression model was run. To examine Asian race- and ethnicity-specific associations, the full logistic model was run separately for all Asians and for each Asian ethnic subgroup. Categories were collapsed or variables excluded when cell sizes were found to be too small for reliable estimations.

All estimates and analyses were weighted using survey weights, provided by CHIS, to adjust for the complex survey design. Statistical analyses were conducted with Stata software (version 12.0; Stata Corporation, College Station, TX). All tests were assessed at a significance level of $\alpha = 0.05$.

Results

Sample Characteristics

All Asians and Asian ethnic subgroup adults between 18-64 years were examined across a range of sociodemographic and acculturation factors. As shown in Tables 4.1 and 4.2, Asian subgroups significantly differed in many of these characteristics ($p<0.05$). For example, 60% of Japanese were 45-64 years old compared to 19% of South Asians and 33% of all Asians, 65% of Koreans were female compared to 53% of all Asians, and Vietnamese reported significantly poorer health status and resided in larger households than all Asians.

[Table 4.1 about here]

Table 4.2 displays the heterogeneity in the predisposing and enabling resources and acculturation factors of all groups. For example, Vietnamese and Japanese were polar opposites across almost all of the characteristics; Vietnamese had low socioeconomic status and less acculturation and the Japanese had much higher socioeconomic status and acculturation. Vietnamese had the highest proportion of low educational attainment (48.3% with high school or less), high levels of public insurance (21.8%) and lack of insurance (19.1%), low household

income (51.0% with <200% FPL), low English proficiency (43.0%), foreign born (85.4%), and living in a concordant neighborhood (10.0%). On the other hand, Japanese had among the highest proportions of high educational attainment (82.6% with some college or more), employment (72.3%, employed and self-employed), employment-based insurance (84.2%), high household income (79.6% with 300%+ FPL), high English proficiency (91.9%), US born (69.6%), and not living in a concordant neighborhood (0.0%). Similarly, the proportions of having a USC were among the highest in Japanese (87.1%), and among the lowest in Vietnamese (79.5%).

[Table 4.2 about here]

Disparities in having a usual source of care by ethnic subgroup

Pair-wise comparisons showed significant variation in the odds of having a USC among Asian ethnic subgroups (Table 4.3). The crude odds ratios suggested that there are significant differences between many of the subgroups. Filipinos, Koreans, Vietnamese, and Other Asians had significantly lower crude odds of having a USC compared to Chinese while South Asians had significantly higher crude odds of having a USC than Filipinos, Koreans, Vietnamese and Other Asians. Koreans had also had 72% lower crude odds of having a USC than Japanese. In most cases, significant differences were attenuated after controlling for acculturation, predisposing and enabling factors. However, many differences persisted or appeared after adjustment for confounders. Koreans had consistently poorer access to care, having significantly lower adjusted odds of having a USC than all other groups except for Japanese. Compared to Chinese and Filipino adults, Korean adults had 69% and 52% lower adjusted odds of having a USC, respectively, while Vietnamese, South Asians and Other Asians had almost 2-3 times greater adjusted odds of having a USC than Koreans (all $p<0.05$). Japanese adults had 52% lower adjusted odds of having a USC compared to Chinese adults ($p<0.01$). Conversely, South Asians had 95% higher adjusted odds of having a USC than Japanese ($p<0.05$).

[Table 4.3 about here]

Associations with having a USC

In the aggregated Asian model, individuals who were highly educated, self-employed, insured, more acculturated, female, and married were more likely to have a USC (Table 4.4). Across the six ethnic subgroups, uninsured adults consistently had significantly lower odds of having a USC than adults with employment-based insurance, ranging from 85% among all Asians to 94% among Koreans (all $p<0.01$). Other than lack of insurance, different trends and associations were observed across the predisposing, enabling and acculturation factors.

Among Chinese American adults, education, employment, other public insurance, length of residence, living in a concordant neighborhood, age, gender and marital status were also associated with having a USC. Chinese adults with some college or vocational school had 68% lower odds of having a USC than those with a graduate degree, while those with other public insurance had 76% lower odds of having a USC. While living in a concordant neighborhood was not associated with having a USC for all Asians, Chinese adults living in an ethnically concordant neighborhood had 57% lower odds of having a USC than Chinese not living in a concordant tract. Self-employed and mid-tenure immigrant Chinese adults had significantly higher odds of having a USC than other employed and US-born Chinese. Among Chinese adults, older age and not being married were associated with lower odds of having a USC while female gender was associated with higher odds of having a USC.

Household income and age were associated with having a USC among Filipino adults. Those with Medicaid had 75% lower odds of having a USC than those with employment-based insurance, and households with an income between 100-199% FPL had 58% lower odds of having a USC compared to the Filipino household with the highest income (300%+ FPL). As observed among all Asians, the odds of having a USC progressively increased with age.

Having a USC was associated with length of residence, age and marital status for Japanese adults. Japanese who were mid-tenure immigrants had 87% lower odds of having a USC. Older age was significantly associated with higher odds of having a USC, but no trend was observed.

Among Korean adults, only lack of insurance was significantly associated with having a USC.

Age and gender were associated with having a USC for Vietnamese adults. Vietnamese females had over 3 times greater odds of having a USC than males while adults 35-44 years had 79% lower odds than adults 18-24 years.

Among South Asian adults, education and other private insurance were associated with having a USC. South Asians with a college and a high school degree had 72-75% lower odds of having a USC than those with a graduate degree. South Asians with other private insurance had 84% lower odds of having a USC.

[Table 4.4 about here]

Discussion

Guided by the Aday and Andersen framework, this study used population-based data to examine variations in having a USC and the factors associated with USC among Asian American ethnic subgroups in California. The results indicate that Asian ethnic subgroups are significantly different from each other in having a USC. The results also highlight significant heterogeneity in the types and trends of race- and ethnicity-specific associations between acculturation factors, predisposing and enabling resources and having a USC. The variation in have a USC varies by Asian ethnic subgroup persisted even after controlling for the effects of acculturation and socioeconomic differences, highlighting that high socioeconomic status does not equate with high access to healthcare among Asians. In particular, Korean and Japanese adults had lower odds of

having a USC even after accounting for acculturation factors. Previous studies that directly compared Asian subgroups also found heterogeneous patterns across different access outcomes by Asian subgroups.[48,49] The heterogeneity found across the Asian subgroups reinforces the importance of conducting disaggregated analyses for the Asian race category and of creating ethnicity-specific policies and services to target improvement in access to care among Asian Americans.

Asians entered the US for a variety of reasons; generally, Chinese, Filipinos, Koreans, and South Asians emigrated for better educational and work opportunities while Vietnamese migrated as refugees seeking asylum. Japanese have a history of long settlement in the US, but recent Japanese immigration has slowed; almost 70% of Japanese in the study population were US-born. When and why a group of Asians enter the US may significantly affect their adjustment to the US and their access to care.[43,45,48,53,57] As this study suggests, it may also influence which and how acculturation factors affect their access to care.

Similar to other studies on Asians, this study found that Korean adults have consistently poor access to care compared to almost all other Asian ethnic groups.[44,48] Poor access among Koreans have been attributed to their relatively new immigrant status, high levels of self-employment – in part due to low English proficiency – and subsequent lack of employment-based insurance, despite average or above-average levels of educational attainment and income.[42,44,48,63,83] Multivariate results from this study highlight that strategies to improve access among Koreans should address the lack of insurance. However, none of the other factors in the model were found to be significantly associated with having a USC for Koreans; other factors of access (e.g., social networks, social cohesion, cultural norms and preferences, system-level barriers) may needed to be considered to fully understand how Korean adults access care.

Poorer access among Japanese adults was especially surprising and had not been tested or observed in the other studies of having a USC among Asians.[48,49] Japanese have been previously

reported to rank among the highest across all socioeconomic indicators, have been in the US for several generations, and have the lowest percentage without a usual place of care.[2,42] The multivariate results suggest that the low access among Japanese adults is driven by mid-tenure Japanese immigrants. Japanese who have arrived more recently to the US largely have migrated to the US on short-term business contracts with Japanese companies. These individuals arrive with the intent to return to Japan in a few years and may have little interest in mastering the US healthcare system, especially since many return to Japan regularly for medical treatment.[148,149] However, those who stay past their short-term contracts may not return to Japan as regularly and do not have knowledge about how best to access the US healthcare system. This behavior suggests that outreach and awareness campaigns among Japanese immigrants should focus on healthcare awareness and knowledge, to encourage familiarity with the US healthcare system. Similarly, areas with large Japanese immigrant populations may consider providing culturally competent services to encourage entry and use of the US healthcare system.

Despite being a more recent immigrant group (illustrated by high levels of recent and mid-tenure immigrants), South Asians were found to have better access to care. This is a new finding that has not been previously observed in the literature. Relatively better access to care among South Asians may be due to the large proportion of Asian Indians that make up the South Asian category. Asian Indians may experience fewer acculturative barriers since English is one of the official languages of India and immigrants are disproportionately well-educated,[58,150] subsequently, Asian Indians may be more likely to understand and use the US healthcare system. High levels of educational attainment, insurance, income, and English proficiency were observed in the sample population, while multivariate results suggest that education and insurance are especially important for having a USC among South Asians. However, generalizations to this population should be made cautiously since the South Asian category is very diverse; for

example, it includes the Asian ethnicities with the highest and lowest median household incomes (Asian Indian and Bangladeshi, respectively).[151]

Primarily immigrating to the US for economic and educational reasons, it is not surprising that this study observed that education, employment status, insurance, and years in the in US are associated with having a USC among Chinese American adults. This study also found that Chinese adults living in an ethnically concordant neighborhood had worse access. Previous studies on Chinese immigrant neighborhoods have found both positive and negative associations with health and health behaviors.[79] While the impact of ethnic neighborhoods on Asian access has not been well studied, these findings suggest that initiatives to improve access among Chinese would benefit from focusing outreach in neighborhoods with high concentrations of Chinese residents. Also notable is the positive association between self-employment and having a USC. Improved access to care may be due to the lower opportunity costs of time among self-employed Chinese adults.[141]

Filipinos have had a longer migration history to the US, with more recent immigrants coming to the US for work opportunities. While Filipinos generally have average or above-average income and education, there is also a significant proportion of immigrant Filipinos with low-skilled jobs who have difficulty accessing care.[152,153] This was supported by multivariate results from this study; Filipinos with low household incomes, Medicaid or no insurance were less likely to have a USC. Efforts to improve access among Filipinos should focus outreach to low-income Filipinos with public or no insurance.

Many Vietnamese immigrants entered the US as political refugees after 1975 and, as this study sample illustrated, have lower levels of English proficiency, educational attainment and income and higher levels of public or no insurance as a group.[53,58,154,155] Previous findings regarding Vietnamese Americans have been mixed. Nguyen observed that older Vietnamese were more likely to have a USC than older Chinese while Frisbie et al., studying a population more

comparably aged to this study, found no difference in having a USC between Vietnamese and Japanese adults.[48,49] We observed that access among Vietnamese adults was no different than other Asian subgroups, but like the other subgroups, Vietnamese with no insurance were less likely to have a USC. Contributing to high levels of access to care among Vietnamese despite low socioeconomic status may be the public assistance and benefits they receive as refugees and the variety of interventions and outreach programs that target them.[154] Refugees are able to apply for green cards within one year of entry into the US.[156] They are also able to access state and federal benefit programs without waiting the extra 5 years imposed on other immigrants.[157,158] Programs such as the Racial and Ethnic Approaches to Community Health (REACH) funded by the Centers for Disease Control and Prevention (CDC) that targets lower-income Asian groups such as Vietnamese have offered them better access to care.[159,160] Public benefits and programs are vital in addressing the health needs of vulnerable populations. Funding cuts like the recent sequestration that reduce the budgets of the CDC and the California Department of Public Health by $580 million and $2 million, respectively, could have long-term, negative impacts on the future health of these populations.[161–163]

It is also important to highlight that persistent variation in access may arise from preferences or habits that Asian immigrants bring from their home countries. For example, the primary care system in Korea is not strong and Koreans are reliant on hospitals to provide healthcare.[164] This preference for hospital care to may have been brought over by Korean immigrants and may contribute to the low levels of USC among Korean Americans.[165] On the other hand, a study in Taiwan found that less than half of the patients surveyed had a USC despite Taiwan's universal health care coverage.[21] The authors hypothesize that low levels of USC are a result of Taiwanese patients "shopping" for providers. These differences in preferences and habits suggest that new strategies need to be developed to complement current efforts to improve access

to care. These strategies should focus on educating individuals on the importance and advantages of having a USC.

In addition to understanding the different Asian ethnic subgroups, it also interesting to identify unique patterns, and lack thereof, in having a USC. While educational attainment levels are generally high for all Asians, they vary considerably by ethnicity both nationally and in California.[2,81] This study found that almost all levels of educational attainment were significantly associated with having a USC for all Asians, but significant associations among the subgroups were found for only Chinese and South Asians. Health insurance has long been recognized as an important enabling resource to access healthcare services for non-Hispanic whites and most minority groups.[12,90,104,166,167] However, these results suggest that while not having insurance is clearly associated with the lack of having a USC among all Asian subgroups, the type of coverage (e.g., public or private) may not be important for most Asian ethnicities. Like other studies on access among Asians and immigrants, household income was found to be largely insignificant for all Asians and Asian subgroups.[49,63,71] This suggests that household income may not be directly associated with access for Asians or other factors such as policies that target lower income Asians may influence the association between income and having a USC for Asian Americans.[78] Finally, a progressive trend by age observed among all Asians was not observed among Koreans, Vietnamese and South Asians. This lack of the expected increase in access by age may be due to difference in preference and expected need.[91] These patterns highlight the variations by subgroup and underscore the need to examine the subgroups separately to develop ethnicity-specific strategies to improve having a USC.

There are several limitations to this study. First, the results of the study may not be generalizable to the rest of the United States since the study sample included California residents in 2005 and 2009. California as the highest proportion of Asian and foreign-born residents and its healthcare system may be more adept at handling these populations. Second, CHIS is not

available in some of native Asian languages (i.e., Tagalong). Therefore, there may be a different response rate by language proficiency and ethnic subgroup; respondents from ethnicities without translated surveys may be more educated or fluent in English. Similarly, response rates may be disproportionately low among undocumented immigrants who are most likely to have access to healthcare problems. Finally, high relative standard errors observed among the subgroups indicate that some of the results should be interpreted with caution. Despite these limitations, the CHIS is the best survey to compare access to healthcare services among different Asian ethnic subgroups at the population level. The CHIS oversamples by Asian ethnicity and provides detailed Asian ethnicity and demographic information that is necessary to understand the resources and barriers that Asians face when accessing care.

In conclusion, the study elucidated differences in having a USC across Asian ethnic subgroups. Also, the study examined the underlying reasons for Asian ethnic subgroup differences in having a USC and determined that patterns of association with access varied by the different ethnicities. These findings indicate that Asians are a heterogeneous population and suggest that further research is warranted for deeper examination of the factors influencing access in Asian Americans. The significant heterogeneity in factors associated with having a USC by Asian ethnic subgroups highlights the need for ethnicity-specific policies and outreach to improve access to care for Asian Americans.

Table 4.1. Demographic characteristics of Asian American adults (18-64 years), California Health Interview Survey, 2005 and 2009

	Asian[a] % (95% CI)	Chinese % (95% CI)	Filipino % (95% CI)	Japanese % (95% CI)	Korean % (95% CI)	Vietnamese % (95% CI)	South Asian % (95% CI)	Other Asian % (95% CI)	p[b]
N	7,566	1,918	882	467	1,138	1,552	740	869	
Gender									<0.01
Male	47.1 (46.6-47.6)	45.5 (41.7-49.4)	48.3 (44.0-52.7)	43.0 (37.1-49.1)	34.8 (28.7-41.4)	47.9 (42.1-53.7)	56.9 (51.9-61.6)	47.8 (42.5-53.1)	
Female	52.9 (52.4-53.4)	54.5 (50.6-58.3)	51.7 (47.3-56.0)	57.0 (50.9-62.9)	65.2 (58.6-71.3)	52.1 (46.3-57.9)	43.1 (38.4-48.1)	52.2 (46.9-57.5)	
Age									<0.01
18-24 years	17.6 (16.1-19.3)	14.6 (11.3-18.6)	17.5 (13.8-22.0)	8.4 (4.6-14.8)	20.3 (14.4-27.8)	19.8 (13.5-28.1)	14.5 (10.3-20.2)	28.8 (24.6-33.4)	
25-34 years	24.5 (22.7-26.4)	23.3 (19.8-27.3)	25.2 (20.8-30.3)	9.6 (6.4-14.1)	26.9 (19.8-35.4)	15.8 (11.8-20.9)	32.3 (27.3-37.8)	29.7 (24.3-35.7)	
35-44 years	24.8 (23.2-26.5)	25.8 (21.7-30.3)	22.0 (18.3-26.3)	22.0 (17.8-26.9)	25.0 (21.0-29.4)	24.3 (19.2-30.4)	31.2 (26.2-36.7)	22.5 (18.8-26.7)	
45-54 years	20.3 (18.9-21.7)	22.5 (19.3-26.1)	20.1 (16.9-23.7)	33.3 (27.7-39.4)	17.2 (14.4-20.5)	25.9 (21.9-30.3)	14.2 (11.2-17.8)	13.6 (10.9-17.0)	
55-64 years	12.8 (11.8-13.8)	13.8 (11.8-16.2)	15.1 (12.2-18.5)	26.7 (21.5-32.7)	10.7 (8.4-13.4)	14.2 (11.4-17.5)	7.8 (5.6-10.8)	5.4 (4.1-7.0)	
Marital status									<0.01
Married	58.8 (56.7-60.8)	63.8 (59.3-68.1)	53.2 (47.9-58.4)	65.5 (58.9-71.4)	58.9 (51.2-66.1)	59.4 (52.5-65.9)	68.8 (62.5-74.5)	42.7 (37.7-47.8)	
Not married	41.2 (39.2-43.3)	36.2 (31.9-40.7)	46.8 (41.6-52.1)	34.5 (28.6-41.1)	41.1 (33.9-48.8)	40.6 (34.1-47.5)	31.2 (25.5-37.5)	57.3 (52.2-62.3)	
Health status									<0.01
Excellent/Very good/Good	85.0 (83.5-86.3)	83.7 (80.6-86.5)	88.0 (84.4-90.9)	92.8 (89.2-95.3)	80.3 (75.6-84.3)	64.1 (59.0-69.0)	96.8 (95.3-97.8)	88.9 (85.4-91.7)	
Fair/Poor	15.0 (13.7-16.5)	16.3 (13.5-19.4)	12.0 (9.1-15.6)	7.2 (4.7-10.8)	19.7 (15.7-24.4)	35.9 (31.0-41.0)	3.2 (2.2-4.7)	11.1 (8.3-14.6)	
Household size									<0.01
1 person	6.8 (5.9-7.8)	7.2 (5.0-10.4)	6.3 (4.6-8.7)	12.6 (10.0-15.9)	7.9 (4.8-12.9)	3.2 (2.1-4.9)	7.0 (4.3-11.2)	6.8 (5.1-9.1)	
2 persons	19.9 (18.2-21.7)	20.3 (17.1-24.0)	16.0 (12.8-19.8)	28.8 (24.0-34.0)	22.7 (17.3-29.1)	15.5 (9.6-24.1)	20.1 (15.7-25.5)	25.7 (21.3-30.5)	
3 persons	23.3 (21.6-25.1)	24.5 (21.6-27.7)	22.7 (18.5-27.7)	27.8 (22.3-34.0)	23.1 (18.9-28.0)	19.1 (14.5-24.7)	27.0 (22.5-32.1)	19.3 (15.7-23.5)	
4 persons	26.3 (24.6-28.1)	24.5 (21.6-27.7)	29.7 (25.5-34.2)	22.9 (18.0-28.8)	26.6 (21.9-31.9)	28.1 (23.0-33.8)	28.1 (24.1-32.5)	19.8 (15.9-24.3)	
5+ persons	23.8 (21.7-25.9)	23.4 (19.1-28.2)	25.3 (20.9-30.3)	7.9 (5.4-11.3)	19.7 (12.7-29.1)	34.1 (28.6-40.1)	17.7 (14.1-22.1)	28.5 (23.1-34.5)	

Note: CI=confidence interval. Sample sizes are unweighted. All percentages are weighted.

[a] The Asian subpopulation includes Chinese, Filipino, Japanese, Korean, Vietnamese, South Asian, and Other Asians.

[b] The χ^2 test of significance among Asian ethnic subgroups.

Table 4.2. Predisposing, enabling, and acculturation characteristics of Asian American adults (18-64 years), California Health Interview Survey, 2005 and 2009

	Asian[a] % (95% CI)	Chinese % (95% CI)	Filipino % (95% CI)	Japanese % (95% CI)	Korean % (95% CI)	Vietnamese % (95% CI)	South Asian % (95% CI)	Other Asian % (95% CI)	p[b]
Predisposing									
Educational attainment									<0.01
Some graduate school or more	19.7 (18.3-21.1)	24.4 (21.1-27.9)	7.8 (5.7-10.5)	22.1 (17.5-27.6)	17.0 (13.5-21.1)	6.1 (4.2-8.8)	47.5 (42.2-52.8)	16.0 (12.7-20.0)	
College degree	34.6 (32.7-36.6)	32.1 (28.1-36.4)	41.9 (36.9-47.1)	37.5 (32.0-43.4)	43.9 (37.3-50.8)	26.1 (19.6-33.8)	30.8 (25.7-36.4)	28.7 (23.8-34.1)	
Some college/AA/vocational school	18.2 (16.6-19.9)	15.5 (12.5-19.0)	24.1 (20.3-28.4)	23.0 (17.9-29.1)	15.3 (10.4-22.0)	19.5 (14.9-25.2)	9.7 (7.2-12.9)	21.2 (17.3-25.7)	
High school graduate/GED	19.9 (18.4-21.4)	18.2 (15.4-21.3)	21.3 (17.1-26.1)	15.0 (10.7-20.8)	18.0 (14.4-22.3)	29.9 (25.4-34.8)	9.7 (7.1-13.1)	27.0 (21.8-32.9)	
Less than high school	7.6 (6.3-9.1)	9.9 (6.6-14.4)	4.9 (2.5-9.3)	2.2 (0.7-6.5)	5.7 (3.8-8.6)	18.4 (14.7-22.9)	2.3 (1.1-4.8)	7.2 (4.8-10.7)	
Enabling									
Employment status									<0.01
Employed	64.1 (62.1-66.1)	61.7 (57.2-66.0)	74.8 (69.9-79.2)	62.5 (56.2-68.3)	46.3 (39.3-53.5)	58.2 (51.8-64.4)	67.5 (61.8-72.8)	63.8 (58.3-69.0)	
Self-employed	9.2 (7.9-10.5)	11.8 (8.5-16.1)	4.7 (3.2-6.7)	9.8 (6.9-13.8)	16.4 (12.5-21.3)	8.2 (5.1-12.8)	8.0 (6.0-10.4)	8.9 (6.7-11.7)	
Unemployed	6.2 (5.1-7.6)	4.7 (2.8-7.7)	7.6 (4.7-12.0)	3.4 (1.8-6.3)	8.6 (4.4-16.1)	4.3 (3.1-6.0)	4.0 (2.7-6.0)	11.1 (7.7-15.6)	
Not in labor force	20.5 (19.1-21.9)	21.8 (18.1-26.0)	12.9 (9.6-17.2)	24.4 (19.2-30.5)	28.7 (23.0-35.1)	29.3 (24.4-34.6)	20.5 (16.0-25.8)	16.2 (12.0-21.5)	
Insurance status									<0.01
Employment-based	64.0 (61.7-66.3)	63.5 (59.0-67.7)	68.1 (63.0-72.9)	84.2 (79.5-88.0)	43.1 (35.6-50.9)	53.5 (47.5-59.5)	76.0 (71.4-80.1)	61.2 (55.6-66.5)	
Other private	9.2 (7.9-10.6)	12.6 (9.2-17.1)	7.0 (4.9-10.0)	6.1 (3.8-9.8)	13.6 (9.8-18.6)	5.5 (3.6-8.5)	8.4 (6.1-11.5)	8.0 (5.6-11.2)	
Medi-Cal (Medicaid)	8.1 (7.2-9.2)	8.0 (5.7-11.3)	7.1 (5.0-9.9)	2.5 (1.4-4.5)	3.9 (2.8-5.6)	19.9 (16.6-23.6)	3.6 (2.1-6.2)	10.2 (7.7-13.4)	
Other public	2.7 (2.0-3.5)	2.3 (1.1-4.6)	4.6 (3.0-6.9)	1.1 (0.3-3.7)	4.2 (1.7-9.8)	1.9 (1.1-3.2)	0.4 (0.1-1.0)	2.3 (1.3-3.7)	
Uninsured	16.0 (14.4-17.8)	13.6 (11.1-16.6)	13.2 (9.4-18.3)	6.1 (3.8-9.6)	35.3 (28.7-42.5)	19.1 (14.9-24.2)	11.5 (8.7-15.1)	18.4 (14.3-23.3)	
Household income									<0.01
<100 % FPL	11.0 (9.5-12.8)	9.8 (7.3-12.9)	8.2 (5.2-12.7)	3.0 (1.6-5.5)	9.7 (6.1-15.1)	22.7 (18.8-27.2)	6.1 (4.0-9.1)	18.8 (14.1-24.7)	
100-199% FPL	15.5 (14.0-17.2)	16.6 (13.0-20.9)	15.1 (12.0-18.9)	6.4 (3.8-10.5)	17.3 (12.7-23.0)	28.3 (22.5-35.1)	7.4 (5.1-10.5)	13.2 (10.2-16.9)	
200-299% FPL	13.1 (11.7-14.6)	12.3 (10.1-14.9)	15.3 (12.2-19.0)	11.1 (7.6-15.9)	14.5 (11.3-18.5)	15.0 (9.2-23.6)	8.4 (6.2-11.2)	13.6 (10.4-17.6)	
300%+ FPL	60.4 (58.2-62.5)	61.4 (56.8-65.7)	61.3 (56.4-66.1)	79.6 (73.9-84.3)	58.5 (51.7-65.1)	33.9 (28.1-40.3)	78.2 (74.2-81.7)	54.4 (49.0-59.7)	
Acculturation									
English proficiency[c]									<0.01
High	82.1 (80.7-83.4)	73.1 (69.0-76.8)	97.5 (95.8-98.6)	91.9 (86.8-95.1)	59.3 (52.2-66.0)	57.0 (51.5-62.4)	97.0 (95.3-98.2)	92.2 (88.9-94.6)	
Low	17.9 (16.6-19.3)	26.9 (23.2-31.0)	2.5 (1.4-4.2)	8.1 (4.9-13.2)	40.7 (34.0-47.8)	43.0 (37.6-48.5)	3.0 (1.8-4.7)	7.8 (5.4-11.1)	
Length of residence in the US[d]									<0.01
US born	28.4 (26.5-30.4)	21.7 (17.9-26.0)	34.3 (29.7-39.4)	69.6 (63.4-75.1)	26.2 (19.2-34.6)	14.5 (8.7-23.2)	12.1 (7.9-18.1)	50.6 (45.5-55.7)	
Recent immigrant	8.0 (6.8-9.2)	8.3 (5.9-11.6)	7.5 (5.4-10.4)	2.4 (1.2-4.7)	12.1 (7.7-18.4)	6.9 (4.7-10.0)	12.8 (9.7-16.6)	1.9 (0.9-3.8)	
Mid-tenure immigrant	21.5 (19.7-23.4)	24.6 (20.7-28.9)	13.6 (11.0-16.7)	6.2 (4.1-9.4)	24.1 (19.1-29.9)	21.9 (18.0-26.3)	40.7 (34.9-46.8)	11.6 (7.9-16.8)	
Long-tenure immigrant	42.1 (40.0-44.2)	45.4 (40.7-50.2)	44.5 (39.8-49.4)	21.8 (16.6-28.0)	37.7 (32.7-43.0)	56.6 (49.9-63.1)	34.4 (29.7-39.5)	35.9 (30.9-41.2)	
Lives in concordant neighborhood[e]									<0.01

	Asian[a] % (95% CI)	Chinese % (95% CI)	Filipino % (95% CI)	Japanese % (95% CI)	Korean % (95% CI)	Vietnamese % (95% CI)	South Asian % (95% CI)	Other Asian % (95% CI)	p[b]
No	94.0 (92.6-95.1)	85.7 (82.0-88.7)	97.1 (95.1-98.2)	100	96.8 (95.1-97.9)	90.0 (81.9-94.7)	98.8 (95.8-99.6)	100	
Yes	6.0 (4.9-7.4)	14.3 (11.3-18.0)	2.9 (1.8-4.9)	0	3.2 (2.1-4.9)	10.0 (5.3-18.1)	1.2 (0.4-4.2)	0	
Having a usual source of care other than ER									<0.01
No	17.5 (15.7-19.5)	12.7 (10.4-15.3)	17.8 (13.6-22.9)	12.9 (8.9-18.2)	34.4 (27.6-41.8)	20.5 (14.9-27.4)	11.5 (8.5-15.5)	20.6 (16.0-26.0)	
Yes	82.5 (80.5-84.3)	87.3 (84.7-89.6)	82.2 (77.1-86.4)	87.1 (81.8-91.1)	65.6 (58.2-72.4)	79.5 (72.6-85.1)	88.5 (84.5-91.5)	79.4 (74.0-84.0)	

Note: CI=Confidence interval; AA=Associate in Arts degree; GED=General Educational Development; ER=emergency room. All percentages are weighted.

[a] The Asian subpopulation includes Chinese, Filipino, Japanese, Korean, Vietnamese, South Asian, and Other Asians.

[b] The χ^2 test of significance among Asian ethnic subgroups.

[c] High English proficiency responses included English only, very well/well and low English proficiency responses included not well/poor.

[d] Recent immigrants have been in the US for <5 years, mid-tenure immigrants have been in the US for 5-14 years, and long-tenure immigrants have been in the US for ≥15 years.

[e] Neighborhoods were classified as race/ethnicity concordant if the percentage of the corresponding race/ethnicity within the resident census tract was ≥40%.

Table 4.3. Pair-wise comparison of Asian American ethnic groups in having a usual source of care, California Health Interview Survey, 2005 and 2009[a]

	Chinese, OR (SE)		Filipino, OR (SE)		Japanese, OR (SE)		Korean, OR (SE)		Vietnamese, OR (SE)		South Asian, OR (SE)	
	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
Chinese	ref.	ref.										
Filipino	0.66 (0.12)†	0.65 (0.16)	ref.	ref.								
Japanese	0.98 (0.23)	0.48 (0.13)‡	1.47 (0.38)	0.73 (0.22)	ref.	ref.						
Korean	0.28 (0.05)‡	0.31 (0.08)‡	0.41 (0.09)‡	0.48 (0.15)†	0.28 (0.07)‡	0.65 (0.22)	ref.	ref.				
Vietnamese	0.56 (0.12)‡	0.61 (0.19)	0.84 (0.22)	0.95 (0.31)	0.57 (0.17)	1.29 (0.45)	2.03 (0.51)‡	1.97 (0.65)†	ref.	ref.		
South Asian	1.11 (0.23)	0.93 (0.25)	1.66 (0.39)†	1.43 (0.41)	1.13 (0.31)	1.95 (0.63)†	4.01 (0.94)‡	2.99 (0.96)‡	1.97 (0.50)‡	1.51 (0.50)	ref.	ref.
Other Asian	0.56 (0.11)‡	0.65 (0.15)	0.84 (0.18)	1.00 (0.25)	0.57 (0.15)†	1.36 (0.41)	2.02 (0.45)‡	2.08 (0.64)†	0.99 (0.24)	1.06 (0.28)	0.50 (0.12)‡	0.70 (0.20)

Notes: OR=odds ratio; SE=standard error
‡ P<0.01
† P<0.05
[a] Adjusted model controls for residence in an ethnically concordant neighborhood, educational attainment, employment status, insurance, household income, language proficiency, length of residence, age, gender, marital status, household size, health status, and survey year.

Table 4.4. Associations with having a Usual Source of Care other than the Emergency Room, California Health Interview Survey, 2005 and 2009

	Asian[a] OR (SE)	Chinese OR (SE)	Filipino OR (SE)	Japanese OR (SE)	Korean OR (SE)	Vietnamese OR (SE)	South Asian OR (SE)
Predisposing							
Educational attainment							
Some graduate school or more	--	--	--	--	--	--	--
College degree	0.56 (0.13)†	1.57 (0.65)	0.48 (0.37)	1.28 (0.72)	1.12 (0.83)	0.18 (0.19)	0.28 (0.14)‡
Some college/AA/vocational school	0.48 (0.10)‡	0.32 (0.12)‡	0.85 (0.72)	1.54 (1.32)	0.64 (0.46)	0.18 (0.17)	0.46 (0.28)
High school graduate/GED	0.60 (0.15)†	1.28 (0.57)	0.92 (0.79)	2.41 (2.55)	0.72 (0.52)	0.17 (0.18)	0.25 (0.12)‡
Less than high school	1.05 (0.39)	0.84 (0.46)	2.01 (2.41)	¶	1.10 (0.91)	0.24 (0.25)	0.56 (0.77)
Enabling							
Employment status							
Employed	--	--	--	--	--	--	--
Self-employed	2.08 (0.61)†	3.33 (1.39)‡	1.34 (1.08)	2.89 (2.90)	3.04 (2.07)	1.03 (0.66)	4.03 (3.69)
Unemployed	0.64 (0.18)	0.38 (0.25)	0.66 (0.48)	0.85 (1.34)	1.43 (1.12)	1.10 (0.60)	0.54 (0.43)
Not in labor force	1.00 (0.18)	1.33 (0.38)	2.41 (1.19)	1.87 (1.21)	0.91 (0.35)	0.50 (0.24)	1.71 (1.32)
Insurance status							
Employment-based	--	--	--	--	--	--	--
Other private	0.64 (0.16)	0.56 (0.24)	1.34 (0.92)	1.00 (1.43)	0.24 (0.19)	0.84 (0.75)	0.16 (0.10)‡
Medi-Cal (Medicaid)	0.81 (0.22)	0.56 (0.31)	0.25 (0.17)†	0.45 (0.47)	0.31 (0.24)	1.17 (0.74)	0.53 (0.71)
Other public	0.91 (0.42)	0.23 (0.14)†	0.64 (0.63)	¶	2.29 (4.57)	0.35 (0.37)	¶
Uninsured	0.15 (0.03)‡	0.09 (0.03)‡	0.07 (0.03)‡	0.08 (0.06)‡	0.06 (0.04)‡	0.07 (0.03)‡	0.13 (0.07)‡
Household income							
300%+ FPL	--	--	--	--	--	--	--
200-299% FPL	1.01 (0.17)	0.69 (0.21)	1.41 (0.66)	3.92 (3.71)	2.08 (0.85)	1.49 (1.04)	0.55 (0.26)
100-199% FPL	0.77 (0.13)	1.02 (0.31)	0.42 (0.18)†	1.64 (2.07)	0.96 (0.53)	1.74 (0.90)	0.74 (0.69)
<100 % FPL	0.96 (0.24)	0.59 (0.24)	1.71 (1.89)	0.17 (0.28)	0.70 (0.41)	1.47 (0.83)	0.75 (0.58)
Acculturation							
English proficiency[b]							
High	--	--	--	--	--	--	--
Low	0.60 (0.13)†	0.63 (0.19)	0.67 (0.78)	0.18 (0.16)	1.14 (0.53)	0.70 (0.41)	0.18 (0.16)
Length of residence in the US[c]							
US born	--	--	--	--	--	--	--
Recent immigrant	0.58 (0.15)†	0.99 (0.47)	0.86 (0.63)	0.45 (0.51)	0.45 (0.33)	0.40 (0.42)	0.06 (0.09)
Mid-tenure immigrant	1.25 (0.28)	2.74 (1.02)‡	0.35 (0.21)	0.13 (0.11)†	2.12 (1.65)	3.70 (2.88)	0.29 (0.44)
Long-tenure immigrant	1.39 (0.30)	1.33 (0.51)	2.42 (1.31)	0.79 (0.54)	2.57 (2.34)	3.17 (2.11)	0.27 (0.41)
Lives in concordant neighborhood[d]							
No	--	--	--	--	--	--	--
Yes	0.62 (0.28)	0.43 (0.12)‡	1.77 (1.70)	¶	2.24 (1.65)	0.14 (0.18)	¶

	Asian[a] OR (SE)	Chinese OR (SE)	Filipino OR (SE)	Japanese OR (SE)	Korean OR (SE)	Vietnamese OR (SE)	South Asian OR (SE)
Control variables							
Age							
18-24 years	--	--	--	--	--	--	--
25-34 years	0.61 (0.16)	0.21 (0.08)‡	2.14 (1.31)	21.26 (24.08)‡	0.18 (0.19)	0.47 (0.33)	0.25 (0.20)
35-44 years	1.10 (0.29)	0.74 (0.34)	6.17 (4.64)†	43.08 (53.84)‡	0.19 (0.22)	0.22 (0.14)†	0.22 (0.20)
45-54 years	1.22 (0.29)	0.37 (0.18)†	5.34 (3.30)‡	12.24 (14.71)†	0.23 (0.32)	0.47 (0.34)	0.42 (0.44)
55-64 years	2.02 (0.59)†	0.72 (0.35)	12.55 (9.11)‡	24.86 (30.14)‡	0.27 (0.43)	1.55 (1.40)	0.39 (0.37)
Gender							
Male	--	--	--	--	--	--	--
Female	2.04 (0.30)‡	2.51 (0.59)‡	2.22 (1.02)	1.80 (0.83)	1.19 (0.57)	3.36 (1.21)‡	1.80 (0.83)
Marital status							
Married	--	--	--	--	--	--	--
Not married	0.58 (0.12)‡	0.41 (0.13)‡	0.96 (0.42)	0.26 (0.19)	0.26 (0.22)	0.47 (0.26)	0.26 (0.19)
Household size							
1 person	--	--	--	--	--	--	--
2 persons	0.77 (0.21)	0.79 (0.37)	0.92 (0.61)	1.36 (1.12)	0.71 (0.43)	2.08 (2.84)	0.27 (0.22)
3 persons	0.82 (0.25)	0.75 (0.33)	1.22 (0.93)	1.93 (1.64)	0.58 (0.41)	1.38 (1.75)	0.61 (0.52)
4 persons	1.04 (0.31)	0.94 (0.45)	1.84 (1.33)	1.55 (1.32)	0.58 (0.45)	1.33 (1.77)	0.24 (0.19)
5+ persons	0.62 (0.22)	0.94 (0.48)	0.71 (0.61)	0.24 (0.22)	0.59 (0.79)	1.02 (1.33)	0.25 (0.21)
Health status							
Excellent/Very good/Good	--	--	--	--	--	--	--
Fair/Poor	0.92 (0.16)	1.14 (0.43)	0.66 (0.54)	1.62 (1.17)	2.07 (0.88)	0.78 (0.30)	1.62 (1.17)
Survey year							
2005	--	--	--	--	--	--	--
2009	0.60 (0.08)‡	1.42 (0.31)	0.31 (0.14)‡	1.32 (0.64)	0.49 (0.17)†	0.09 (0.04)‡	1.32 (0.64)

Notes: OR=odds ratio; SE=standard error; AA=Associate in Arts degree; GED=General Educational Development; ER=emergency room.

¶ Category or variable was excluded due to insufficient sample size. For education, less than high school was added to high school. For insurance, other public was added to Medi-Cal (Medicaid). Living in an ethnically concordant neighborhood was omitted from these analyses.

‡ P<0.01

† P<0.05

[a] The Asian subpopulation includes Chinese, Filipino, Japanese, Korean, Vietnamese, South Asian, and Other Asians.

[b] High English proficiency responses included English only, very well/well and low English proficiency responses included not well/poor.

[c] Recent immigrants have been in the US for <5 years, mid-tenure immigrants have been in the US for 5-14 years, and long-tenure immigrants have been in the US for ≥15 years.

[d] Neighborhoods were classified as race/ethnicity concordant if the percentage of the corresponding race/ethnicity within the resident census tract was ≥40%.

CHAPTER 5: MANUSCRIPT 3

Understanding Pathways to Usual Source of Care among Asian Americans

Abstract

Objectives. To test the applicability of the Andersen health behavioral model and the role of acculturation for having a usual source of care (USC) among Asian American adults. Differences in pathways among 3 ethnic subgroups (Chinese, Korean, and Vietnamese) were also examined.

Methods. Data were from the 2009 California Health Interview survey. Using the Andersen health behavioral model, path analyses were conducted to examine influences on having a USC among Asian American adults (n=4,021). Multiple-group analysis was used to test for differences in pathways among Chinese (n=851), Koreans (n=640), and Vietnamese (n=1,152). The direct and indirect associations of length of residence, English proficiency, and residence in an ethnically concordant neighborhood were tested using the Wald test.

Results. The Andersen model adequately predicted having a USC among Asian American adults. As expected, income and insurance were directly associated with access. Insurance had the strongest effect on having a USC. Unexpectedly, higher levels of education were associated with lower income and, in turn, lower income was associated with having a USC. Pathways for Chinese, Koreans, and Vietnamese differed significantly. The acculturation measures did not significantly contribute to the USC model.

Conclusions. The Andersen model is appropriate for studying USC among Asian American adults though relationships vary by ethnicity. Acculturation and its measures may need to be re-examined and further tested.

"Understanding Pathways to Usual Source of Care among Asian Americans"

Background

Asian Americans are the fastest growing racial/ethnic group in the United States. They currently number at 14 million and are projected to reach more than 33 million by 2050.[1] Relatively little is understood about how the experiences and circumstances of Asian Americans affect their health and health behaviors as a whole and as disparate ethnic subgroups despite their rapidly increasing presence in the US. Although Asian Americans have been traditionally considered to be a model minority group with better health and socioeconomic status than non-Hispanic whites,[10,168] recent research strongly suggests that persistent disparities in health and health behaviors exist between Asians and non-Hispanic whites and among different Asian ethnicities.[31,37,42,144,145]

Having a usual primary care provider or usual source of care (USC) is a crucial element of access to healthcare services that has been linked to better health outcomes and healthcare experiences.[9,12,14,16–18,29] However, Asians have lower odds of having a USC than non-Hispanic whites and there is significant variability by Asian ethnic subgroups.[10,37–39,42,48,49] In 2004-2006, 16% of Asians lacked a USC compared to 13% among non-Hispanic whites; approximately 16% of Chinese and Vietnamese lacked a USC compared to 25% of Koreans.[42] Having a USC is especially important among Asians due to higher risk for several chronic and acute conditions which would benefit from better coordination and follow-up care.[27,28] For example, the tuberculosis incidence rate in Asians is 26 times that of non-Hispanic whites, while incidence rate for foreign-born Asians is 21 times that of US-born Asians.[29,30] Similarly, age-adjusted cervical cancer rates are elevated in Asians compared to non-Hispanic whites (8.8 and 7.3 per 100,000, respectively), and ranges between 5.4 in Filipinos and 14.0 in Vietnamese.[31] The higher risk of

morbidity is compounded by lower rates of health-seeking behavior, including screenings and follow-up exams, among immigrants.[20,32–34]

Comparisons between Asian American and non-Hispanic white adults and across Asian ethnic subgroups have found heterogeneous patterns of associations of the predisposing characteristics, enabling resources, and need with access.[49,71,169] However, this research largely focuses on direct comparisons of access to care by race and ethnicity groups and lacks understanding of the pathways and mechanisms that drive having a USC among Asians and Asian subgroups. While many studies that look at access in Asian Americans use the Andersen health behavioral model to frame their work,[45,47,49,107] little research has been done to empirically test whether the direct and indirect relationships hypothesized for the general population hold for Asian Americans and Asian ethnic subgroups.

Health services research studies with Asians commonly use acculturation measures to account for the effects of immigration. These studies assume a linear relationship between acculturation and health and health behavior; more acculturated individuals are more likely to have better health access.[55,131] Length of time spent in the US, English language proficiency and residence in a concordant neighborhood have been used to explain differences in access to care in minority and immigrant populations.[48,51,52,62,66,72,75,77–79,170,171] Length of residence has a strong and robust effect on access to care in immigrants, and a previous study on Korean immigrants found it to indirectly effect utilization through insurance.[48,51,52,62,72] Conversely, findings regarding studies on the influences of English proficiency and concordant neighborhoods have been mixed depending on the outcome and the ethnic group.[66,72,75,77–79,170,171] However, despite these findings, if and where acculturation factors fit in the Andersen behavioral model has not been explicitly tested in the general Asian American population.

The widespread use of the Andersen health behavioral model despite critical gaps in the literature necessitates examination of the model for Asian American adults. As a result, this study

uses a representative, population-based sample of Asian Americans to address three specific research questions. First, does the general Andersen health behavioral model predict having a USC in Asian American adults? Second, do the relationships among predisposing factors, enabling factors, need and having a USC vary by Asian American ethnic subgroup? Finally, how do acculturation factors (length of residence, English proficiency, and residence in an ethnically concordant neighborhood) influence having a USC among Asian American adults?

Theoretical/Conceptual Model

The Andersen health behavioral model is the most widely used model to study access to health services.[90,104,172] Developed and tested as a pathway model, it hypothesizes that an individual's propensity (predisposing), means (enabling), and need are related to health services access. Among predisposing characteristics, prior studies in the general population found advanced age, being female, being married, and higher educational attainment to be positively associated with having a USC.[91–94] Among enabling resources, health insurance, employment, and household income are positively associated with access to care and mediate between the predisposing characteristics and access.[17,71,90–93,96,97] Finally, the lack of a USC is driven by those who report not needing a USC because they are seldom or never sick.[91]

Several researchers, including Andersen, have expanded the Andersen health behavioral model to integrate race- and ethnicity-specific acculturation factors to increase the generalizability of the model.[45,49,106,107] These factors have been hypothesized to be both predisposing characteristics and enabling factors for Asian Americans,[45,49,86,107] and have been observed to have a mixed influence on access to care for all Asian American and Asian ethnic subgroup adults.

Methods

Data Source and Sample

Data were from the 2009 California Health Interview Survey (CHIS), the largest statewide survey in the US.[109] CHIS is a biennial, cross-sectional, random-digit-dial telephone survey of California residents that uses a multi-stage sample design. Survey interviews were conducted in English, Spanish, Chinese (Mandarin and Cantonese dialects), Korean, and Vietnamese to increase the representativeness of Asians in the survey.[109,111,133] The 2009 CHIS oversampled on Koreans and Vietnamese. All variables used were imputed by CHIS.[109]

The sample consisted of 4,021 Asians between the ages of 18 and 64 years. Children and elderly adults were not included in the analysis because they have been shown to have different health needs. Multiple-group analysis was conducted on Chinese (n=851), Korean (n=640), and Vietnamese (n=1,152); Filipinos, Japanese, South Asians, and Other Asians were excluded from subgroup analyses due to insufficient sample size.

Measures

Primary outcome. Having a USC other than the emergency room (ER) was measured using a dichotomous variable in response to the questions "Is there a place that you usually go to when you are sick or need advice about your health?" and did not specify ER to the follow-up question "What kind of place do you go to most often—a medical doctor's office, a clinic or hospital clinic, an emergency room, or some other place?" Negative responses to question 1 and affirmative responses that specified an ER in question 2 were coded "0". All other affirmative responses were coded "1".

Enabling variables. Health insurance was dichotomized as insured and not insured. Household income reflects total annual household income from all sources, including public assistance, and was reported as a multiple of the US federal poverty level (FPL). Household employment status combined working status information of the respondent and the respondent's spouse (if applicable). Household employment status was determined by the highest level of

employment for either spouse and was categorized as unemployed, working part-time/not in labor force, and working full-time.

Acculturation factors. Length of residence combined nativity and duration in the US; respondents were classified as recent immigrant (<5 years), mid-tenure immigrant (5-14 years), long-tenure immigrant (≥15 years), and US-born. English language proficiency was a self-reported item asked of all respondents who completed the survey in a language other than English and was categorized as not at all, not well, well, very well, and English only. Residence in an ethnically concordant neighborhood was constructed by linking the 2010 U.S. Census Summary File 1 census tract-level population data to the respondents' census tract to determine the percentage of same ethnicity residents residing in the tract. For example, the census tract percentage of Chinese was linked to individuals identified as Chinese. Census tracts were divided by prevalence using a cut point of 40%; respondents living in areas of ≥40% ethnicity concordance were considered to be living in an area of high ethnic concordance while those living in areas <40% lived in an area of low to medium ethnic concordance.[77,120]

Key predisposing and need variables. Educational attainment was the highest level of education the respondent reported as completed and was categorized as less than high school, high school graduate or GED, some college/Associates degree/vocational school, college degree, and some graduate school or more. Need was measured by self-reported health status and categorized as poor, fair, good, very good, and excellent. Other predisposing variables (age, gender, and marital status) were included as control variables.

Statistical Analysis

All descriptive analyses were conducted using Stata software (version 12.0; Stata Corporation, College Station, TX) to account for the complex sampling design. Adjusted Wald

test was used to test for overall difference in means and proportions across the 3 ethnic subgroups.

Path analysis is an analytical approach that allows for specification of the relationship between variables, and is used to test hypothesized mediation models.[121] Path coefficients can be estimated simultaneously and both the direct and indirect effects of the factors can be tested while controlling for covariates. Based on theory and a review of previous research, a hypothesized, schematic representation of the pathways to having a USC was tested among Asian American adults.[122] This approach was particularly appropriate because the contribution of the acculturation factors could be ascertained and the different direct and indirect relationships among the ethnic subgroups could be identified.

The hypothesized, Andersen path model estimated is presented in Figure 5.1. To address the first research question, we hypothesized that the relationships of the Andersen model holds for all Asian American adults. The chi-square test of model fit, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the weighted root mean square residual (WRMR) were used to evaluate the overall fit of the hypothesized model. A non-significant chi-square, a CFI value greater than or equal to 0.95, a RMSEA less than 0.05, and a WRMR less than 1.0 indicated adequate model fit to the data.[121,127]

[Figure 5.1 about here]

To address the second research question, we hypothesized that ethnicity moderates the overall model paths and significant differences in pathways exist among Chinese, Korean, and Vietnamese adults. Multiple-group analyses were used to test if differences in the model were statistically significant across ethnic subgroups. Multiple-group analyses uses the chi-square difference test to test for invariance between the baseline model where all path coefficients were free to vary across the ethnic subgroups and the restricted model where all the paths were

constrained to be equal across the groups.[127] The fit statistics used to address the first research question was also used to assess the fit of the multiple-group model.

Finally, to address the third research question, we hypothesized that the acculturation factors significantly contribute to the pathways to having a USC. Acculturation factors were introduced into the model as a direct effect on having a USC and an indirect effect through employment. The acculturation factors were first added individually to test their individual association and then together to test for a joint association. The Wald Test of Parameter Constraints was used to test the significance of including the acculturation factors.

The path model was fitted using Mplus 7.0 using the weighted least squares mean variance (WLSMV) estimator. To account for the different types of dependent (mediating) variables in the model, Mplus uses probit regression for binary or ordered categorical dependent variables and linear regression for continuous variables. Both standardized and unstandardized estimates were presented for the model with all Asians. The standardized estimates allow for assessment of the relative magnitude of an association within a model and the unstandardized estimates are used to make comparisons across models.

Results

Descriptive Statistics

Table 5.1 presents the weighted means/percentages and standard errors for all Asians and the Chinese, Korean, and Vietnamese subgroups. Twenty percent of the full Asian sample lacked a USC. The majority of Asians were employed full-time (72.7%), insured (85.0%), well-educated (55.6% with a college degree or more), female (53.2%), married (55.8%), and good or better health (86.7%). The mean age and household income was 38.0 years and 5.0 times FPL, respectively. About a fourth had been in the US for fifteen years or less, 15.6% had low English proficiency (not at all or not well), and 6.4% resided in an ethnically concordant neighborhood.

[Table 5.1 about here]

Significant differences were observed among the Chinese, Korean and Vietnamese subgroups in all characteristics except household employment and marital status. Chinese were most likely to have a USC and insurance (88.2% and 87.2%, respectively) while Koreans were least likely to have either (59.5% and 67.8%). Vietnamese had the lowest mean household income (3.1 times FPL), while Chinese and Koreans reported comparable mean incomes. Over 35% of Koreans and Vietnamese had low English proficiency. Koreans had both the highest percentage of recent immigrants and US-born (13.4% and 38.5%). More Chinese lived in an ethnically concordant neighborhood (16.1% compared in 1.5% of Koreans and 10.3% of Vietnamese). More than half of Chinese and Koreans had a college degree or more compared to less than 35% of Vietnamese. Almost 30% of Vietnamese reported poor or fair health compared to less than 15% of Chinese and Koreans. Almost three-quarters of the Koreans were female compared to just over 50% among Chinese and Vietnamese.

Testing the Andersen Model for Asian Americans

The general Andersen model was tested using the total sample of Asian Americans. The chi-square test of model fit found the fit of the hypothesized model to not be entirely adequate and suggested the model be rejected (Table 5.2, $\chi^2(6, N=4{,}021) = 13.05$, $p=0.04$). However, this indicator is well-known to be very sensitive to sample size and non-normal distribution of data.[124] The other fit indices indicate that the model fits the data well (CFI=0.97; RMSEA=0.02; WRMR=0.64).

[Table 5.2 about here]

Figure 5.2 shows the significant, standardized and unstandardized estimates of the path coefficients in the hypothesized model for Asian Americans. All direct estimates for Asian American adults are presented in Appendix Table 5.3. The dashed lines indicate non-significant

paths at p=0.05. Both educational attainment and health status were positively associated with having a USC though employment and insurance. Higher levels of educational attainment and better health status were associated with better employment which, in turn, was associated with having insurance and a USC. Education also had a positive indirect association on having a USC through income, but educational attainment was negatively associated with household income and, in turn, income was negatively associated having a USC. Several of the hypothesized associations were not found to be significant. Health status did not have significant associations with income, insurance or having a USC. Employment was not associated with income, nor income with insurance. Health insurance had the strongest association within the model (standardized direct effect=1.537).

[Figure 5.2 about here]

Multiple-Group Path Analysis

Constraining the model parameters to be equal across Chinese, Korean, and Vietnamese significantly worsened the fit of the models ($\Delta\chi^2$= 86.49, Δdf=40, p<0.05), indicating that the null hypothesis that the all paths are the same across the three groups can be rejected. The fully unconstrained multiple-group model fit the data well and suggests that the USC path model is moderated by ethnicity (Table 5.2, $\chi^2(18) = 25.19$, p=0.12; CFI=0.97; RMSEA=0.02; WRMR=0.82).

For all three subgroups, all pathways to having a USC were through insurance. The positive association between insurance and having a USC was the strongest association within each subgroup model. All direct estimates by Asian American ethnic subgroup models are presented in Appendix Table 5.3.

[Figure 5.3 about here]

The pathway through insurance to having a USC for Chinese adults was similar to the model of all Asians (Figure 5.3). Education and health status were positively associated with having a USC through employment and insurance. The key difference was that income was not significantly associated with having a USC. Income had a direct, negative association with education and an indirect, positive association with education through employment.

[Figures 5.4 and 5.5 about here]

For Korean and Vietnamese adults, the only pathway to having a USC was from health status to insurance; health status was positively associated with insurance, and in turn, insurance as positively associated with having a USC (Figures 5.4 and 5.5). Although not associated with having a USC, other key pathways were notable among Koreans and Vietnamese adults. Among Koreans, education and health status were positively associated with income through employment. The magnitude of the association between employment and income was strong among Koreans (standardized direct effect=0.691). Conversely, education was negatively associated with income through employment among Vietnamese. Education was positively associated with employment and employment was negatively associated with income. Unlike the other subgroups, health status was not significantly associated with employment among Vietnamese.

Testing Acculturation Factors

The acculturation factors (length of residence, English proficiency and residence in an ethnically concordant neighborhood) were added to the hypothesized model as both a direct effect on USC and an indirect effect through employment. Though the models adequately fit the data (Table 5.2), the Wald tests indicated that the acculturation factors do not significantly improve the fit of the model and should not be included in the model (all $p>0.05$). All total and total indirect effects were not significant (data not shown).

Discussion

Our study is the first to simultaneously model the relationships among key predisposing, enabling and need from the Andersen health behavioral model to predict the likelihood of having a USC in Asian American adults. Using a typical version of the Andersen model, we found adequate fit for the model when applied to Asian Americans, and that having a USC was influenced by insurance and income. We also determined that pathways to having a USC varied by Asian ethnic subgroups, and the only pathway observed was through insurance. Finally, we also observed that the three commonly used acculturation factors did not significantly influence the USC pathways.

Much of the findings from this study are broadly consistent with results from previous studies. Education and health had a positive association with employment, which led to having insurance, and ultimately having a USC among Asian Americans.[91–94] As suggested in the literature, this study found insurance to be a consistently strong, key factor in explaining having a USC.[91,93,96] The Asian model also found education to be positively associated with having a USC through income. Unexpectedly, higher levels of educational attainment were associated with lower income and, in turn, low income was associated with having a USC. The literature on economic attainment suggests that Asians have a lower return of education on income compared to whites.[173–178] Furthermore, recent and foreign-educated Asian immigrants may experience an earning disadvantage despite comparable education levels due to foreign educational credentials, limited work experience in the US, and limited English-language abilities.[173–176,178] The progressive trend normally observed between income and having a USC was unexpectedly flipped among Asian Americans in our study. However, other studies have also found non-significant or slightly negative association of income with access.[49,63,91,179,180] This relationship coupled with the lack of significant association between income and insurance suggests that income is not a barrier to having a USC among Asians. Instead, these relationships may reflect

other barriers to access such as preferences away from or not valuing a USC. Specifically, preferences and habits that immigrants bring from their home countries, including not wanting a USC, reliance on acute care, or desire to "shop" for providers, may limit the importance of income as a barrier to access among Asians.[21,164,165,180] Alternatively, given the timing of the data collection, these relationships may have been affected by the 2007-2009 recession. The record number of layoffs in 2009 across different industries and sectors may have impacted the relationship between education and income.[181] The recession may have also resulted in preferences away from or the inability to afford healthcare among higher income families during the financial slowdown. National rates of having a USC decreased by 2-3 percent for all minority groups between 2006-2007 and 2009-2010.[182] While implementation of the insurance subsidies through the Affordable Care Act will help ensure that individuals have access to care despite economic downturns, further research is needed to examine the negative association between income and having a USC. Finally, health status was not observed to be directly associated with having a USC. The lack of this association has been previously observed and suggests that need do not drive having a USC in Asians.[49,50,72]

The Andersen health behavioral model was moderately successful when applied to the subgroups. The multiple-group analysis determined that pathways to having a USC differed significantly between Chinese, Korean, and Vietnamese adults. While the only pathway to having a USC for all three groups was through insurance, the pathways to insurance varied among the groups. Like the general Asian model, education and health status was indirectly associated to having a USC through employment and insurance for Chinese, but education was not indirectly associated to having a USC for Koreans and Vietnamese. Instead, health status indirectly influenced having a USC through insurance for Korean and Vietnamese adults. These differences in pathways may be related to the types of employment that these subgroups are engaged in and their types of insurance coverage. The pathways to insurance for Chinese are associated with

employment, and, in fact, Chinese were more likely to be employed in white-collar occupations at large firms that provide employer-based coverage.[85,183] Conversely, the pathway leading to insurance among Koreans and Vietnamese is influenced solely by health status in that those with better health were associated with having insurance. This unexpected relationship may exist because sicker Korean and Vietnamese adults were unable to afford insurance or were denied individual insurance because of pre-existing conditions. Koreans were more likely to be self-employed or working in small firms while Vietnamese were most likely to be employed in lower-paying blue-collar or service sector positions.[83,184] As these types of employment are less likely to offer group health insurance or require employees to contribute more to the cost of insurance, sicker individuals may have less opportunities and more difficulty in obtaining insurance.[185] This suggests that while employment is not associated with having a USC in the Vietnamese and Korean models, employment characteristics ultimately create a barrier to having a USC. This compounds the problem of poor access among Korean and Vietnamese adults since the sicker individuals are then less likely to have good follow-up or coordination of care. While not on the pathway to having a USC, several other relationships, or lack thereof, are worth noting. Income did not have a significant association on having a USC among the subgroups. The lack of association has been observed among other studies examining Asian subgroups and, as discussed previously, may be due to preferences away from having a USC since income was not found to be a barrier to access.[49,63,179] Among Vietnamese, education influenced income through employment; higher educational attainment led to better employment (more hours) which, unexpectedly, led to lower income. Although counterintuitive, this may be a reflection of the blue-collar and service industries that Vietnamese work and the high proportion of Vietnamese with public assistance.[184,186] When families have more hours of employment, eligibility for public benefit may decrease, effectively reducing their household income.

When testing three commonly used acculturation measures, all of them failed to significantly contributed to the USC model for Asian Americans. Previous studies looking at the pathways between acculturation and utilization have shown mixed results. Song et al. found length of residence to increase utilization through insurance among Korean Americans immigrants with high blood pressure and Choi et al. found recent, older immigrants to be less likely to have a USC due to lack of insurance.[51,86] However, Markides et al. did not find acculturation (ethnicity of friends, language use, and having traditional Mexican values) to significantly contribute to pathway models to access among 3 generations of Mexican Americans.[95] It is important to note that over 70% of our sample was US-born or long-tenure immigrants and spoke English well or better, suggesting that most of the Asians our study may be familiar with the US healthcare system and had fewer communication barriers. Future research should test the influence of acculturation among more recent immigrants. Alternatively, it may be that the 3 acculturation measures used are not be the most appropriate proxies of acculturation, and other aspects or measures of acculturation may demonstrate a stronger relationship with having a USC. In fact, Lee et al. found interview language to better differentiate acculturation than length of residence and self-reported English proficiency.[60] Interview language should be used to test the influence of acculturation on having a USC. While the acculturation measures should be tested on the subgroups, previous analyses suggest that these three acculturation measures will have minimal contributions to the subgroup path models.[179] Finally, Hunt et al. and Abraído-Lanza et al. advised researchers to step back to re-examine the assumptions and definition of acculturation due to serious conceptual and factual errors in its conceptualization.[61,131] The authors noted that key issues that impact culture and health (such as realities of being an immigrant and discrimination) have been ignored and that the complexities of acculturation cannot be adequately captured with simple indicators of language, insurance, or education. Further investigation into these issues could help explain the negative association between education and income in Asians.

There are several limitations to this study that should be addressed in future studies. First, this study measures acculturation through single-item, one-dimensional proxies and assumes that acculturation is a linear process. While this study purposely focused on observed measures because they are easily quantified and acted upon, use of acculturation scales may better capture the complex dimensions and domains of acculturation.[61,187] Second, the results of this study may be limited by the use of one-year of data, especially since the US was in the midst of a financial crisis in 2009 and levels of unemployment and poor access in the US were at a record high. However, many of our findings confirm those from prior studies that examine access among Asian Americans using data from other years. Finally, this study has the usual limitations of cross-sectional data; causality and temporality cannot be determined in the model. While the model is based in theory and previous research suggests that the ordering of the variables follow the pattern that was tested, alternative models cannot be ruled out. Despite these limitations, this study makes important contributions to the understanding having a USC among Asian Americans. It is the first study to assess the appropriateness of using the Andersen health behavioral model for Asian Americans using a large, population-based survey. Furthermore, by simultaneously examining both the direct and indirect pathways, the study is able to reveal the underlying mechanisms that influence having a USC among Asian Americans and among three important Asian ethic subgroups.

There are several policy and research implications from our findings. First, this study confirms that insurance is the key factor of having a USC. The expansion of insurance coverage through the Patient Protection and Affordable Care Act (ACA) will help improve insurance access for many individuals. This is an especially pressing need among Koreans, two-fifths of whom lack insurance. However, the most vulnerable will be Koreans who reside in states that opt out of Medicaid expansion and have cities with significant Korean populations (i.e., Texas, Virginia).[6,188] Only 9% and 15% of low-income Koreans in this sample had insurance and a USC,

respectively (data not shown). However, while the ACA allows Korean and Vietnamese with pre-existing conditions to purchase care, a gap in the current law leaves citizens below the poverty level without tax subsidies if their state does not expand their Medicaid program, potentially increasing the vulnerability of the poorest and sickest individuals.[189] Second, this study also found that the influence of income on having a USC to be non-significant or counterintuitive among Asians, suggesting that high-income Asians may be choosing to not have a USC. To counteract this, public campaigns and interventions may focus on educating Asians about the importance of having a USC. Given the higher risk for certain acute and chronic conditions among Asian Americans, these educational messages should focus on the importance of continuity of care for chronic diseases and screening for high risk conditions. Targeted messages could be delivered through ethnicity-specific media and venues, such as churches for Koreans or community groups for Chinese and Vietnamese.[159,165,190] Third, relatively little is understood about what factors significantly influence having a USC in Korean and Vietnamese adults. While several other studies have also identified insurance and its cost as a key barrier to access among Koreans and Vietnamese, studies looking at the general population found that less than 15% of those lacking a USC identified cost or financial burden as the reason.[83,91,180,191,192] Future studies should also explore other reasons for not having a USC, such as different preferences for care. Other factors of access such as social networks and system-level barriers should also be modeled to assess how these factors may influence access among Korean and Vietnamese adults. Finally, our findings suggest that acculturation is not a major factor in having a USC. However, it is possible that more comprehensive acculturation measures would reveal a stronger relationship with having a USC than was found in this study.

This study contributed to the existing literature by being the first study to use large, population-based survey to evaluate how well the Andersen health behavioral model predicts having a USC among Asian Americans and three Asian ethnic subgroups. This study further

examines the underlying relationships that influence having a USC and how acculturation affects the model. The results suggested that the model performed adequately in Asian Americans and its use for Asian Americans is appropriate. Our study also confirmed the importance of insurance and found a direct, negative association between income and having a USC. However, pathways to insurance differed among Chinese, Korean, and Vietnamese adults and income was not found to have an association with having a USC among the different subgroups. Finally, we did not find acculturation to significantly influence having a USC. The lack of significant findings for acculturation underscore our lack of understanding and the complexity of health behaviors among Asian Americans.

Table 5.1. Characteristics of Asian American adults (18-64 years), California Health Interview Survey, 2009

	Weighted means and percentages (SE)				
Variables	Asians	Chinese	Korean	Vietnamese	p*
N	4,021	851	640	1,152	
Weighted N	3,280,379	848,784	300,563	371,391	
Having a usual source of care other than ER					p<0.01
No	20.3 (1.7)	11.9 (1.8)	40.5 (6.6)	31.8 (5.9)	
Yes	79.7 (1.7)	88.2 (1.8)	59.5 (6.6)	68.2 (5.9)	
Mediating variables					
Employment status					p=0.76
Unemployed	6.5 (1.3)	4.4 (1.3)	12.8 (6.9)	4.0 (1.2)	
Working part-time/Not in labor force	20.8 (1.8)	23.4 (4.4)	23.4 (5.5)	27.6 (4.6)	
Working full-time	72.7 (2.1)	72.2 (4.3)	63.8 (7.2)	68.5 (4.8)	
Insured					p=0.01
No	15.0 (1.7)	12.8 (2.6)	32.2 (6.1)	17.8 (3.7)	
Yes	85.0 (1.7)	87.2 (2.6)	67.8 (6.1)	82.2 (3.7)	
Household income (100% FPL)	5.0 (0.2)	5.0 (0.3)	5.1 (0.6)	3.1 (0.3)	p<0.01
Acculturation factors					
English proficiency					p=0.03
Not at all	1.5 (0.5)	3.3 (1.8)	2.2 (0.9)	3.5 (1.3)	
Not well	14.1 (1.3)	22.3 (3.6)	34.4 (6.2)	33.0 (4.5)	
Well	25.7 (1.9)	37.3 (4.4)	15.5 (3.5)	25.4 (4.0)	
Very well	30.1 (2.1)	21.5 (3.3)	34.7 (7.8)	28.6 (7.0)	
English only	28.6 (1.8)	15.5 (2.2)	13.2 (3.3)	9.4 (3.0)	
Length of residence in the US					p=0.02
Recent immigrant	6.9 (1.0)	8.2 (2.6)	13.4 (5.0)	6.4 (2.1)	
Mid-tenure immigrant	19.0 (1.8)	20.3 (3.8)	19.4 (4.4)	13.8 (2.6)	
Long-tenure immigrant	40.9 (2.0)	47.5 (4.2)	28.7 (4.5)	57.7 (6.0)	
US born	33.2 (2.1)	24.0 (4.0)	38.5 (7.7)	22.1 (6.6)	
Residence in ethnically concordant neighborhood					p<0.01
No	93.6 (1.0)	83.9 (3.0)	98.5 (0.5)	89.7 (4.6)	
Yes	6.4 (1.0)	16.1 (3.0)	1.5 (0.5)	10.3 (4.6)	
Predisposing/Control variables					
Educational attainment					p<0.01
Less than high school	7.2 (1.4)	10.5 (3.5)	3.4 (1.3)	13.8 (2.6)	
High school graduate/GED	20.4 (1.8)	17.6 (2.8)	16.4 (3.9)	26.7 (4.2)	
Some college/AA/vocational school	16.8 (1.5)	14.9 (3.6)	15.4 (6.6)	24.1 (4.6)	
College degree	35.2 (2.0)	32.4 (3.9)	50.1 (7.0)	29.4 (6.7)	
Some graduate school or more	20.4 (1.6)	24.6 (3.4)	14.6 (3.3)	5.9 (1.6)	
Health status					p<0.01
Poor	2.7 (0.5)	1.0 (0.3)	2.1 (0.6)	6.5 (1.8)	
Fair	10.6 (1.0)	12.8 (2.4)	13.0 (3.3)	23.2 (3.8)	
Good	29.1 (1.9)	25.6 (3.5)	35.7 (6.3)	29.0 (4.4)	
Very good	37.2 (2.2)	44.6 (4.5)	35.5 (7.8)	34.9 (6.6)	
Excellent	20.4 (1.7)	15.9 (2.4)	13.8 (3.1)	6.4 (1.9)	
Age	38.0 (0.5)	38.9 (1.1)	33.9 (1.5)	38.4 (1.5)	p=0.02
Gender					p=0.02
Male	46.8 (2.1)	46.6 (4.3)	26.6 (5.2)	47.9 (5.7)	
Female	53.2 (2.1)	53.4 (4.3)	73.4 (5.2)	52.1 (5.7)	
Marital status					p=0.46
Not married	44.2 (2.2)	38.3 (4.4)	49.2 (7.0)	42.5 (6.2)	
Married	55.8 (2.2)	61.7 (4.4)	50.8 (7.0)	57.5 (6.2)	

Note: SE=standard error; AA=Associate in Arts degree; GED=General Educational Development; ER=emergency room. All values are weighted.

*Adjusted Wald test of overall difference by ethnic groups.

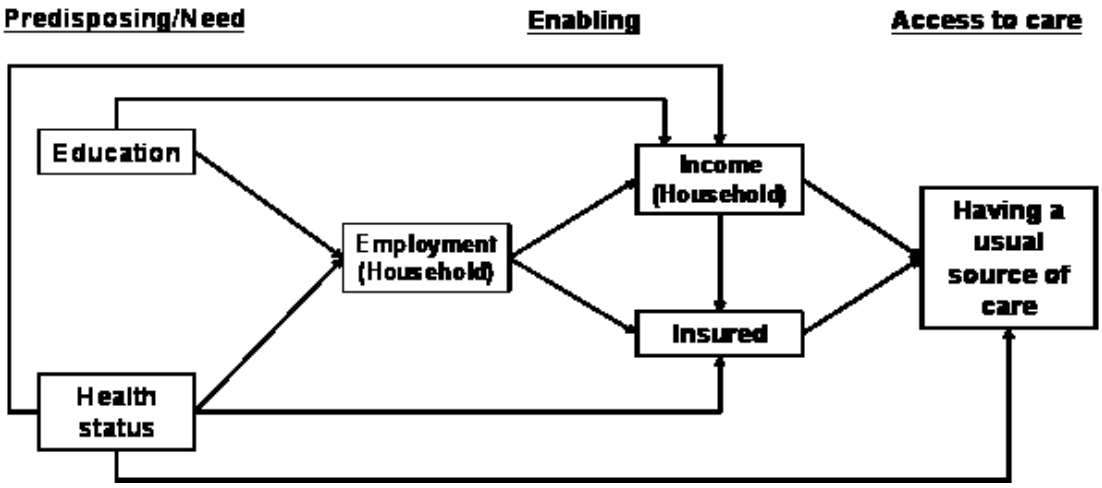


Figure 5.1. Hypothesized Andersen health behavioral path model of having a usual source of care.

Table 5.2. Fit statistics for usual source of care path model for Asian American adults (18-64 years), California Health Interview Survey, 2009

Model	χ^2	*df*	χ^2 p-value	Misfit RMSEA	RMSEA 90% CI Lower	RMSEA 90% CI Upper	Fit CFI	WRMR	p-value*
Andersen Model for all Asian Americans	13.047	6	0.0423	0.017	0.003	0.030	0.970	0.637	--
Multiple-group Andersen model for Chinese, Korean and Vietnamese									
Unconstrained	25.187	18	0.1198	0.021	0.000	0.039	0.969	0.817	--
Constrained	107.779	58	0.0001	0.031	0.022	0.040	0.788	2.022	0.0000
Acculturation models									
Andersen + length of residence	21.460	8	0.0060	0.020	0.010	0.031	0.945	0.768	0.2939
Andersen + English proficiency	21.754	8	0.0054	0.021	0.010	0.031	0.941	0.771	0.0974
Andersen + concordant neighborhood	14.166	8	0.0775	0.014	0.000	0.025	0.974	0.618	0.1914
Andersen + all 3 acculturation factors	35.450	12	0.0004	0.022	0.014	0.031	0.902	0.907	0.1446

Note: Results are based on weighted sample. Models adjusted for age, sex, and marital status.

* Wald chi-square test of model parameters was used to test the acculturation variables. Chi-square difference test was used to test for model invariance among the ethnic subgroups.

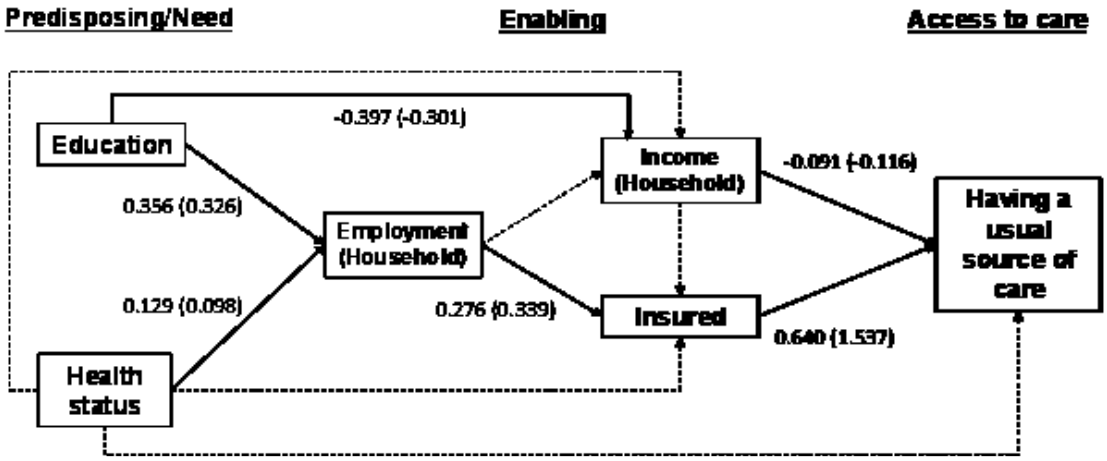


Figure 5.2. Path analytic model of having a usual source of care among all Asian American adults.

Significant unstandardized path coefficients are provided with standardized coefficients in parentheses. Dashed lines show non-significant unstandardized paths at p=0.05. Age, marital status, and gender were included as covariates and their paths are not depicted in the model. Path coefficients for age to employment, and marital status to employment and income, and gender to USC were positive and for age to income were negative; these coefficients were significant.

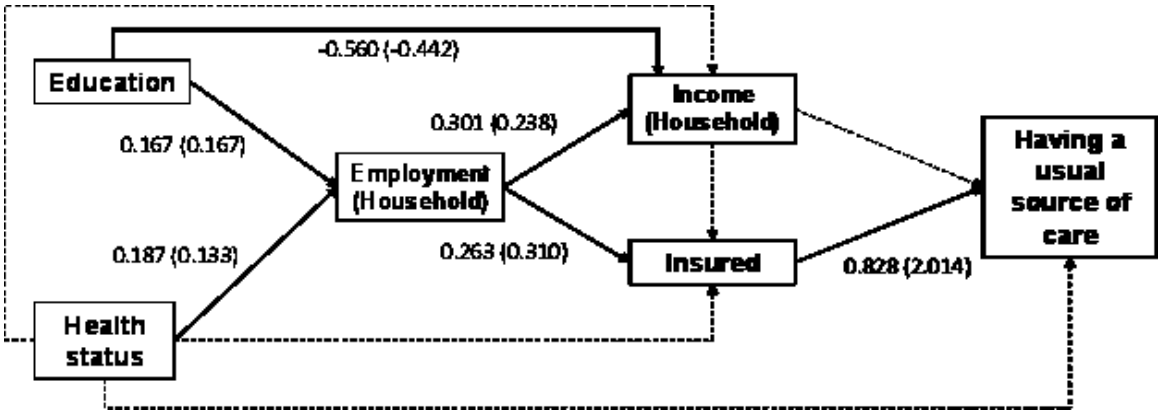


Figure 5.3. Path analytic model of having a usual source of care among Chinese adults.
Significant unstandardized path coefficients are provided with standardized coefficients in parentheses. Dashed lines show non-significant unstandardized paths at p=0.05. Age, marital status, and gender were included as covariates and their paths are not depicted in the model. Path coefficients for marital status to employed, income and insured were positive and for age to income were negative; these coefficients were significant.

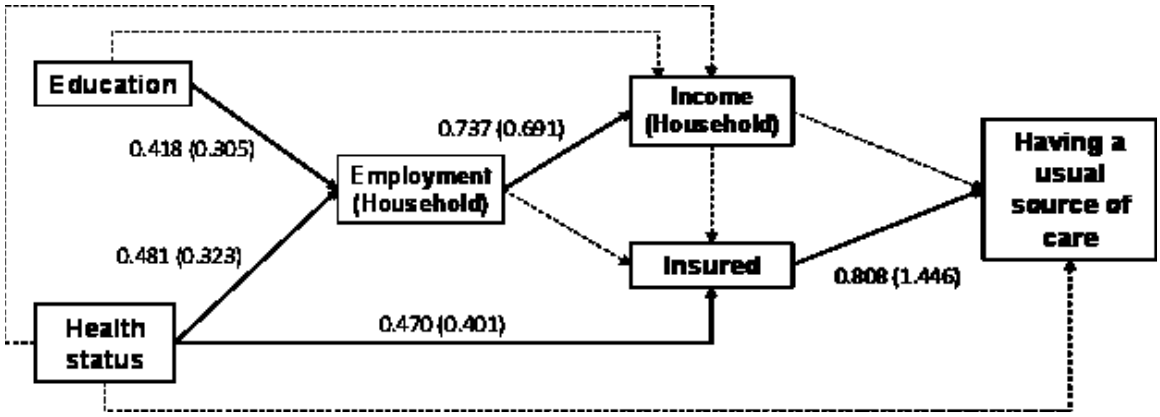


Figure 5.4. Path analytic model of having a usual source of care among Korean adults. Significant unstandardized path coefficients are provided with standardized coefficients in parentheses. Dashed lines show non-significant unstandardized paths at p=0.05. Age, marital status, and gender were included as covariates and their paths are not depicted in the model. Path coefficients for age to employment were positive and age to income were negative; these coefficients were significant.

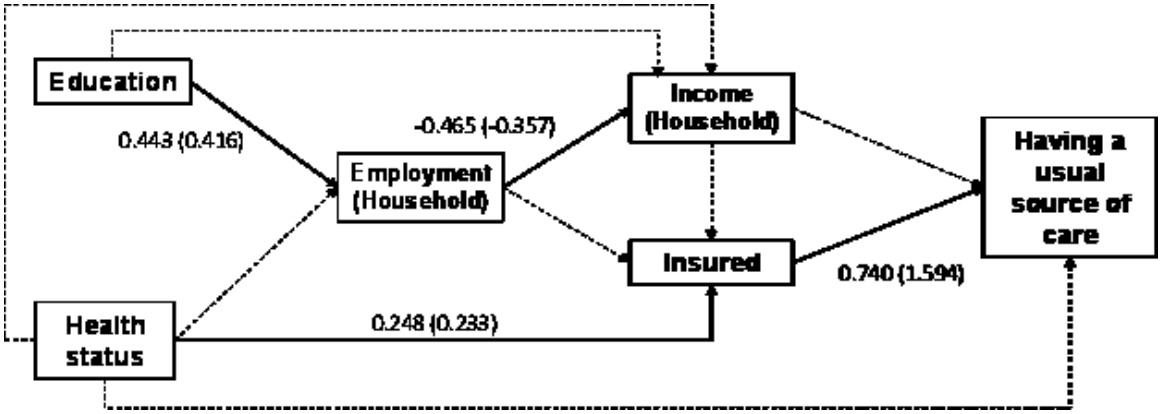


Figure 5.5. Path analytic model of having a usual source of care among Vietnamese adults. Significant unstandardized path coefficients are provided with standardized coefficients in parentheses. Dashed lines show non-significant unstandardized paths at p=0.05. Age, marital status, and gender were included as covariates and their paths are not depicted in the model. Path coefficients for age to insurance and marital status to employment and income were positive and significant.

Table 5.3. Weighted path coefficients to having a usual source of care among Asian American adults (18-64 years), California Health Interview Survey, 2009

Dependent variable	Independent variable	All Asians			Chinese			Korean			Vietnamese		
		Unstandardized		Standardized	Unstandardized		Standardized	Unstandardized		Standardized	Unstandardized		Standardized
		Estimate	SE	estimate	Estimate	SE	estimate	Estimate	SE	estimate	Estimate	SE	estimate
Having a usual source of care	Income	-0.091*	0.05	-0.116	-0.065	0.07	-0.079	-0.074	0.18	-0.083	-0.106	0.09	-0.126
	Insured	0.640*	0.12	1.537	0.828*	0.22	2.014	0.808*	0.29	1.446	0.740*	0.20	1.594
	Health	0.093	0.07	0.074	0.040	0.13	0.027	-0.041	0.14	-0.029	0.039	0.15	0.030
	Female	0.509*	0.17	0.405	0.448	0.30	0.327	0.001	0.41	0.000	0.566	0.35	0.420
Insured	Employment	0.276*	0.06	0.339	0.263*	0.08	0.310	0.128	0.19	0.162	0.196	0.13	0.217
	Income	0.028	0.04	0.041	0.005	0.07	0.008	-0.046	0.14	-0.063	0.033	0.05	0.048
	Health	0.102	0.07	0.095	-0.113	0.11	0.095	0.470*	0.16	0.401	0.248*	0.12	0.233
	Age	0.008	0.01	0.098	-0.017	0.01	0.193	0.005	0.01	0.054	0.029*	0.01	0.349
	Married	-0.059	0.18	-0.054	0.579*	0.23	0.521	0.120	0.32	0.106	-0.108	0.26	-0.097
Household income	Education	-0.397*	0.07	-0.301	-0.560*	0.12	-0.442	-0.330	0.18	-0.226	-0.144	0.12	-0.103
	Employment	0.050	0.07	0.042	0.301*	0.12	0.238	0.737*	0.20	0.691	-0.465*	0.13	-0.357
	Health	-0.095	0.07	-0.060	-0.156	0.12	-0.088	-0.181	0.18	-0.114	0.082	0.14	0.053
	Female	0.098	0.14	0.060	0.179	0.27	0.108	0.137	0.40	0.091	-0.282	0.25	-0.176
	Age	-0.025*	0.01	-0.202	-0.040*	0.01	-0.314	-0.054*	0.02	-0.436	-0.015	0.01	-0.125
	Married	0.837*	0.17	0.519	0.820*	0.27	0.494	0.377	0.37	0.250	1.235*	0.33	0.771
Household employment	Education	0.356*	0.05	0.326	0.167*	0.07	0.167	0.418*	0.12	0.305	0.443*	0.10	0.416
	Health	0.129*	0.04	0.098	0.187*	0.09	0.133	0.481*	0.14	0.323	0.107	0.12	0.090
	Female	0.019	0.12	0.014	-0.245	0.19	-0.186	-0.144	0.30	-0.102	0.172	0.26	0.140
	Age	0.011*	0.01	0.110	0.004	0.01	0.038	0.042*	0.02	0.367	0.013	0.01	0.142
	Married	1.227*	0.14	0.941	1.527*	0.19	1.165	0.779	0.50	0.548	0.903*	0.26	0.735

Note: Results are based on weighted sample. Models were adjusted for age, sex, and marital status.
* $p<0.05$

CHAPTER 6: DISCUSSION

Previous chapters included three manuscripts that focus on understanding how Asian American adults access care by systematically examining the relationships among acculturation, key predisposing characteristics, enabling resources, and having a usual source of care (USC) for Asian American adults in the United States. This chapter summarizes these findings, discusses each of the manuscripts and the study as a whole, provides limitations and strengths of the study, and presents research and policy implications.

Summary of Findings

This study broadens the understanding of the variations and underlying mechanisms of access to care among Asian American adults. Variation in having a USC was observed between Asian American and non-Hispanic white adults and among Asian ethnic subgroups. Different types and patterns of factors were also found to affect having a USC between Asian Americans and non-Hispanic whites and among Asian ethnic subgroups in this study. The study also verifies that the Andersen health behavioral model is an appropriate model to predict USC among Asian Americans. Generally, health insurance coverage was strongly and consistently associated with having a USC across all Asian Americans and Asian ethnic subgroups. Furthermore, it is on the direct pathway to having a USC through which other factors influence having a USC. On the other hand, factors such as health status were either not associated with having a USC or had an indirect effect for certain groups. The acculturation factors helped explain the disparity in having a USC between Asian Americans and non-Hispanic whites, but were not found to significantly contribute to the USC pathways.

Before addressing how different factors influenced having a USC in Asian Americans and in Asian American ethnic subgroups, the studies focused on understanding disparities in

having a USC. The first study examined the disparity in having a USC between all Asian Americans and non-Hispanic whites. Starting from a crude model of race and having a USC and systematically adding key predisposing factors (educational attainment), then enabling factors (household income, employment status, and insurance type), and finally acculturation factors (English proficiency, years in the US and living in a racially concordant neighborhood) into the model showed a gradual attenuation in the magnitude and significance of the disparity in having a USC. The final model showed that while Asians had a 23% lower odds of having a USC, this association was not statistically significant. This finding suggested that the acculturation factors that account for the effects of immigration explained much of the observed disparities in models on accessing care.

The second study examined the variation in having a USC among Asian ethnic subgroups (Chinese, Filipinos, Japanese, Koreans, Vietnamese, South Asians, and Other Asians). Following a logistic model with all the predisposing characteristics, enabling resources and acculturation factors, pairwise comparisons were used to compare how having a USC differed among the subgroups. This analysis found that Korean Americans consistently had lower odds of having a USC compared to all other Asian ethnic subgroups except for Japanese Americans. Japanese Americans also had lower odds of having a USC than Chinese and South Asians. This results indicated that the Asian ethnic subgroups are significantly different from each other in having a USC, even after controlling for the effects of acculturation and socioeconomic differences.

To begin understanding variations in access and how different factors influence having a USC, all Asians, non-Hispanic whites and the ethnic subgroups (Chinese, Filipinos, Japanese, Koreans, Vietnamese, and South Asians) were modeled in Manuscripts 1 and 2 (Chapters 3 and 4), controlling for acculturation factors, predisposing characteristics, and enabling resources. The third manuscript (Chapter 5) used a hypothesized Andersen health behavioral path model to delve into the mechanism underlying having a USC across and within Asian Americans. The pathway

model included all Asian adults, and also specifically compared Chinese, Korean, and Vietnamese adults. Not surprisingly, significant associations, patterns of associations, and pathways of influence of the key factors with having a USC varied by race and by ethnic subgroup. The findings across the manuscripts for the acculturation factors, key predisposing characteristics, enabling resources, and need are summarized.

Overall, results from the path analysis suggested that the Andersen health behavioral model fit adequately when applied to Asian Americans and its use for Asian Americans is appropriate.

The significance and trends of three acculturation factors – length of stay in the US, English proficiency, and residence in a concordant neighborhood – were of particular interest in this study. Among all Asian American adults, the first manuscript found recent immigration and low levels of English proficiency to be associated with lower odds of having a USC, while residence in a racially concordant neighborhood was not found to be significantly associated with having a USC. The second manuscript determined that the significance of the acculturation factors within each subgroup differed when compared to all Asian Americans and when compared across subgroups. While living in an ethnically concordant neighborhood was not associated with having a USC for all Asians, Chinese adults living in an ethnically concordant neighborhood had 57% lower odds of having a USC than Chinese not living in a concordant neighborhood. Additionally, mid-tenure immigrant Chinese adults had significantly higher odds of having a USC than US-born, Chinese adults. Conversely, Japanese who were mid-tenure immigrants had 87% lower odds of having a USC. English proficiency was not found to be significantly associated with having a USC for any of the subgroups. Finally, for the third manuscript, the acculturation measures were added to the model, individually and jointly, as a direct association on having a USC and an indirect association through employment. Though the models with the acculturation measures adequately fit the data, the acculturation factors did not

individually or jointly significantly improve the fit of the model. This suggests that these acculturation measures do not have a strong influence on having a USC. However, it is important to note that over 70% if the Asian population sampled were long-tenure immigrants or US-born and over 80% had high English proficiency, which may have limited the ability to examine these relationship and underestimated the importance of these factors to more recent immigrant Asian populations.

The lack of insurance was found to be a consistently strong, key factor in having a USC across all Asian Americans and Asian ethnic subgroups. For all Asian Americans, those lacking insurance had 85% lower odds of having a USC compared to those with employer-based insurance. Among the six Asian ethnic subgroups, uninsured adults consistently had significantly lower odds of having a USC than adults with employment-based insurance, ranging from 87% among South Asians to 94% among Koreans. The third manuscript also found insurance to be the strongest factor associated with having a USC among all Asian adults and among for Chinese, Koreans, and Vietnamese adults. Although pathways influencing insurance varied, having insurance was observed to be directly and positively associated with having a USC. Due to more nuanced categorization of insurance in the first 2 manuscripts, the importance of type of insurance on having a USC was examined. Insurance types appeared to play a different role for Asian Americans than for non-Hispanic whites. While only uninsured Asian adults had significantly lower odds of having a USC, the first manuscript found that non-Hispanic white adults with Medicaid and other private insurance also had lower odds of having a USC compared to those with employer-based insurance. Among the different subgroups, there was no clear relationship between the different types of insurance categories and having a USC. Chinese adults with other public insurance had 77% lower odds of having a USC compared to those with employer-based insurance while Filipino adults with Medicaid had 75% lower odds and South Asian adults with other private insurance had 84% lower odds. These findings suggest that the

lack of health insurance is a key barrier to having a USC among Asian Americans but the influence of insurance type may depend on the specific subgroup.

The lack of influence of household income on having a USC was unexpected. Among the logistic models for all Asians and the majority of the subgroups, income was not found to have a significant association with having a USC. The only exception was among Filipinos; households with an income between 100-199% FPL had 58% lower odds of having a USC compared to the Filipino household with the highest income (300%+ FPL). In contrast, a significant, regressive trend in having a USC as household income decreased was observed in non-Hispanic whites. In the path model for all Asians, income was found to be directly and negatively associated with having a USC. The direct association between income and having a USC did not persist across the Chinese, Korean, or Vietnamese models. In these path models, income was also not found to be significantly associated with insurance. In aggregate, these findings suggest that income is not a barrier to having a USC among Asian Americans.

Employment was found to significantly influence having a USC in all Asian adults and in Chinese adults, but did not appear to be associated with having a USC for the other subgroups. Although no differences were found between unemployed and employed adults in the logistic models, self-employed Asians and Chinese were found to have higher odds of having a USC than other employed. Employment was also determined to be on the pathway to having a USC for all Asians and Chinese; health status and education were positively associated with employment which, in turn, was positively associated with having a USC. Among Korean and Vietnamese adults, employment was not on the pathway to having a USC, but its relationships with other measures are notable. Among Koreans, the associations were similar to all Asians and Chinese in that health status and education were positively associated with income through employment. However, among Vietnamese, employment was negatively associated with income. This counterintuitive relationship between income and employment may be a reflection of the low-

paying industries that Vietnamese work and the higher levels of public assistance received. As families gain more hours of employment (moving from unemployed to part-time employment to full-time employment), they may be effectively reducing their total annual income by losing their eligibility for public assistance.

Educational attainment appears to have a unique influence on health access among Asian Americans. Though less commonly observed in the literature, some graduate school was used as the reference category for Asian Americans due to high levels of educational attainment among Asians. The greater distinctions in educational attainment revealed an interesting pattern between education and having a USC. The first manuscript found that lower odds of having a USC persisted across almost all of the education levels in Asian Americans, except for those with less than high school, when compared to Asian individuals with some graduate school. In comparison, only non-Hispanic whites with less than a high school diploma had significantly lower odds of having a USC. What made this finding so striking was that there was virtually no change in the magnitude of the disparity in having a USC with more education, suggesting that higher levels of education attainment do not eliminate or reduce barriers to having a USC among Asians. Among Asian subgroups, education was found to be significant for Chinese and South Asian adults. Chinese adults with some college or an Associates degree had 68% lower odds of having a USC compared to Chinese with some graduate school while South Asians with a college degree and a high school diploma had 72% and 75% lower odds of having a USC. Though non-significant, the lack of a gradient in USC by education largely persisted across all of the subgroups. Finally, the path analytic model determined that educational attainment was indirectly associated with having a USC. As expected, education was positively associated with having a USC through employment and insurance among all Asians. Education also indirectly and positively influenced having a USC through income, but the direction of the associations were unexpected in that education was negatively associated with income and, in turn, income was negatively associated

with having a USC. The literature on economic attainment suggests that Asian Americans may have an earning disadvantage despite high levels of education because of foreign educational credentials, limited work experience in the US, and limited English-language abilities.[173–176,178] Among the subgroup models, education was on the expected pathway to having a USC for Chinese through employment and insurance but not on the pathways for Koreans and Vietnamese. The negative relationship between income and education was also observed among Chinese adults but this pathway not associated with having a USC. Otherwise, among Koreans and Vietnamese, education was positively associated with employment.

Health status was not highlighted in the first 2 manuscripts and was largely found not to be significantly associated with having a USC among Asians and Asian ethnic subgroups (and non-Hispanic whites). However, the path analytic models revealed that health status had a vital indirect influence on having a USC that showed different pathways to access. For all Asians and Chinese, health status indirectly and positively influenced having a USC through employment and insurance. However, for Koreans and Vietnamese, health status bypassed employment to be directly and positively associated with insurance. The finding that healthier individuals purchase health insurance may be due to the industries and employment-types that Koreans and Vietnamese are employed. This suggests that sicker Koreans and Vietnamese adults without access to less-expensive group health insurance may not have insurance due to its high cost or to pre-existing conditions. The different pathways to having a USC among the subgroups suggested that although employment was not on the pathway to having a USC for Koreans and Vietnamese, employment characteristics may be important to explaining differences in insurance and having a USC for these groups.

In sum, this study found important variations in having a USC and the underlying mechanisms between Asian American and non-Hispanic white adults and among Asian ethnic subgroups. Many of associations and pathways to having a USC found in this study were unique

to Asian Americans and may be implicitly related to their experiences immigrating to and in the US. These findings underscore the diversity and complexity of healthcare access among Asian Americans.

Study Limitations and Strengths

This research was subject to several limitations that should be considered when interpreting the results of the study. Limitations described here include a summary of the limitations described in Chapters 3 through 5 and also include limitations to the overall study.

The results of the study may not be generalizable to the rest of the United States since the sample included California residents in 2005 and 2009 for the first and second study and only the 2009 residents in the third study. California has the highest proportion of Asian residents (13.1% in California vs. 4.8% in the US) and its healthcare system may be more adapted to serve this population which may result in an underestimation of the odds of low access to care.[7] However, percentages of Asian and non-Hispanic white adults who have a USC in this study (82.5% and 88.2%, respectively) are similar to published national percentages (83% and 86%).[42] Second, CHIS is not available in some of native Asian languages (i.e., Tagalong). Therefore, there may be a different response rate by language proficiency and ethnic subgroup; respondents from ethnicities without translated surveys may be more educated or fluent in English. Similarly, response rates may be disproportionately low among undocumented immigrants who are most likely to have access to healthcare problems. Finally, high relative standard errors observed among the results for the ethnic subgroups indicate that some of the results should be interpreted with caution.

More generally, CHIS is cross-sectional in design and there is no way to determine the causality or temporality of the models. This is an especially important limitation for the third study. Although the conceptual framework and the path model are based in the Andersen health

behavior model and previous research suggests that the ordering of the variables follow the patterns tested, alternative models cannot be ruled out.

Certain pertinent variables were unavailable in the dataset, therefore analyses did not include some of the factors considered to be important determinants in acculturation and in access to care for Asian Americans. It was not possible to fully examine the concept of acculturation since acculturation scales were not available in the survey. For example, it was also not possible to examine other variables such as health beliefs, understanding of American healthcare and its system, cultural norms and preferences, use of alternative/traditional medicine, social cohesion, and physicians per capita.

Finally, given the cross-culture nature of surveying the Asian population, items from the survey may have been perceived and answered different by the different subgroups. However, the designers of CHIS aimed for cross-cultural equivalence in the survey through cultural and linguistic adaptation.[133] The survey was translated using the refereed single forward translation method, focus groups were used to assess the suitability of the survey translation, and interviewers underwent cultural debriefings. While the item asking the respondent whether he or she had a "usual place to go get health care" was problematic because several respondents gave responses that were not an option, these responses were addressed and resolved in the interviewer debriefing.

Despite these limitations, this is one of the first studies to examine variations in access to care among Asian American adults and the relationships with acculturation factors and key predisposing and enabling resources. This study uses cross-sectional, population-based survey data to address the dissertation questions to increase generalizability of the findings. The CHIS contains rich information on specific Asian ethnic subgroup and detailed demographic information allowing linkages to other data sources, particularly census data. CHIS is the also most appropriate survey for answering key health and health behavior questions for Asian

Americans because it oversamples on the key Asian ethnic subgroups and conducts the survey in several languages native to Asians and provides detailed Asian ethnicity and demographic information that is necessary to understand the resources and barriers that Asians face when accessing care.

Implications of the Study

Unique challenges arise from the diversity of the Asian American population. In recognition of the critical issues facing Asian Americans, the Obama administration has renewed attention to the healthcare needs of the Asian American population through Executive Order 13515 and the Patient Protection and Affordable Care Act of 2010 (ACA). President Barack Obama signed Executive Order 13515 in 2009 to reinstate the White House Initiative on Asian Americans and Pacific Islanders (AAPIs) and the President's Advisory Commission on Asian Americans and Pacific Islanders.[193] The Initiative addresses issues that concerning the AAPI community and to increase access and participation of AAPI in federal programs. To date, the Initiative has addressed barriers to healthcare access in Asian Americans, primarily through ensuring that federal programs are linguistically and culturally competent and developing new data collection standards for AAPI populations.[194] The ACA and the Executive Order have identified and will address key barriers to healthcare access that were also found in this study. Coupled with the findings of this study, the new policies will generate important implications for health policy and research.

Policy Implications

Like prior studies, health insurance was determined to be the key factor influencing healthcare access. Lacking health insurance was consistently found to be significant and was the only pathway to having a USC for Chinese, Koreans, and Vietnamese. Prohibition of denial of coverage or extra charges due to pre-existing conditions and tax credits to offset premium costs

are two crucial methods by which the ACA will help the sickest and poorest Asians improve access through insurance. The ACA's expansion of health insurance will have significant effects on the legal Asian American population. Through the expansion of parental health insurance, 121,000 Asian Americans adults between 19-25 years who would otherwise have been uninsured have insurance.[195] Also, more than 2 million Asian American adults in the US and nearly 800,000 Californian Asians will have the opportunity to obtain insurance through the Health Insurance Marketplaces or Medicaid expansion.[195–197] The expanded insurance coverage is expected to improve access and increase use of primary and preventive services among Asians. Koreans and Vietnamese are in the position to benefit the most since 35% of Koreans and 19% of Vietnamese in the 2005 and 2009 CHIS sample were uninsured. However, it is important to remember that many of the most vulnerable Asians will not benefit from the ACA. Many states have declined to expand insurance coverage through their Medicaid programs. Some of the largest Korean and Vietnamese populations are in states that opt out of expansion (i.e. Texas and Virginia) and these individuals will need help accessing healthcare and health insurance.[6,188] Additionally, since the ACA was written with the assumption that all states would expand Medicaid, individuals with incomes below 100 percent of poverty and living in states that do not expand Medicaid will not be eligible for Medicaid or private insurance tax subsidies.[189] Low-income groups such as the Vietnamese who reside in states that opt out will be particularly vulnerable. Throughout this process, it will be important to monitor uptake in insurance and in having a USC among Asian Americans. Experience from Massachusetts' health reform suggests that additional, targeted outreach and enrollment efforts will be needed to address disparities in insurance coverage and to ensure access to a USC.[198] The enrollment (and re-enrollment) efforts should be culturally and linguistically appropriate to encourage and simplify the process. Since having insurance does not ensure having a USC, assistance should be provided to the newly enrolled to find appropriate providers and to navigate the healthcare system. Finally, 1.3 million Asians in the US are undocumented and also do not have access to health insurance through the ACA.[199] While the

$11 billion in increased funding for community health centers through the ACA will help widen the safety net for these populations, local community groups should target their outreach and funding to help these groups improve their access and care.

Additional efforts to complement expanded insurance coverage will be needed to address disparities in having a USC among Asian Americans. Despite the importance of improving the healthcare system to be more accessible and amenable to the needs of the Asian population, many individuals may not recognize the importance of having a USC. The results of this study strongly suggest that income and educational attainment may not be barriers that limit access to a USC for Asian Americans. Instead, it may be that previous experiences, preferences and cultural norms of Asian immigrants are producing the differential levels of USC across subgroups. For example, mid-tenure Japanese immigrants may have low access to care because they may have been dis-incentivized to learn about and access the US healthcare system when they first migrated to the US. In a similar vein, Korean immigrants may not value having a USC since the Korean healthcare system is reliant on hospital care.[164,165] These different experiences and habits suggest that complementary strategies need to be developed to educate individuals on the importance and advantages of having a USC. Given the higher risk for certain acute and chronic conditions among Asian Americans that would benefit from better continuity and coordination of care, these educational messages should focus on promoting health-seeking behaviors, focusing on the long-term value of continuity of care for chronic diseases and screening for high risk conditions. Targeted messages could be delivered through ethnicity-specific media and venues that serve these populations, such as churches for Koreans or community groups for Chinese and Vietnamese.[159,165,190]

National campaigns such as Healthy People 2010 had limited value for Asian Americans because the lack of research and baseline information inhibited the ability to observe changing health and health behaviors.[200] The findings of this study strongly support the need for better

understanding of the complex health behaviors of Asian Americans and provides baseline information on access to care for the major Asian ethnic subgroups and the variation among the subgroups. In efforts to resolve the data deficiency and to identify health differences among Asian populations, the ACA and Department of Health and Human Services (DHHS) have improved data collection standards by expanding the race question to include Asian ethnicities (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Other Asian) for all federally conducted and supported surveys and by improving data collection quality and methods among Asian communities.[201–203] The new data collection standards will be vital for tracking and measuring health and health behaviors among Asian Americans and Asian subgroups. Having national-level research and estimates will increase the generalizability of findings for all Asian Americans, and especially for the subgroups. Being able to quantify variations and changes in access will help highlight and target populations with poor access to care so that more assistance and funding can be provided for these populations. This is especially important for smaller populations (i.e., Koreans and Japanese) because when aggregated into "Asians" or "Other Asians", their differences and disparities cannot be observed.[204] However, data collection improvement efforts for Asian Americans should include translations of the survey in multiple Asian languages to ensure that estimates are not biased towards Asian populations with high English proficiency.

Finally, identified by the government as important barriers to good health and access to care, lack of language proficiency and cultural differences hinder immigrants' abilities to communicate and to navigate the health care system. Since this study determined that the acculturation factors are not on the pathway to having a USC, this suggests that increased linguistic competency will not improve having a USC among Asian Americans. However, the findings can be used to help inform intervention and campaign designers of the specific profile of Asian American immigrants who are less likely to have access to a USC. Recent Asian

immigrants and Asians with low English proficiency were associated with poor access to a USC. More specifically, the lack of acculturation was found to be especially detrimental for Japanese mid-tenure immigrants. Linguistically and culturally competent campaigns targeted to these population should emphasize the long-term value and importance of having a USC. In addition to understanding value, these interventions should ensure that these individuals have the key tools to gain access to the healthcare system, such as having insurance (as eligibility permits) or knowing how to access community health centers. Once awareness and entry into the healthcare system is gained, linguistically and culturally appropriate services, as recommended by the enhanced National Standards for Culturally and Linguistically Appropriate Services (CLAS) in Health and Health Care, may help improve the use of healthcare services through better coordination and continuity of care and increased use of preventive services.[205]

Directions for Future Research

This study presents important implications for future research. The Andersen health behavioral model was determined to be adequate for explaining factors that predict having a USC among all Asian Americans. However, the conceptual model for specific Asian ethnic subgroups may be more complex. For example, both the logistic and pathways models for Korean adults largely found insurance to be the only key factor to have a direct association with having a USC. This suggests that the Andersen and acculturation factors were not sufficient in explaining health access for Koreans. Future research incorporating other factors such as social networks, social cohesion, cultural norms and preferences, and system-level barriers may shed further insight on the mechanisms behind having a USC for Korean adults. Additionally, although several other studies have identified insurance and its cost as a key barrier to access among Koreans, studies looking at the general population determined that less than 15% of those lacking a USC identified cost or financial burden as the reason.[83,91,180,191,192] Future studies should explore whether there are

other reasons to explain the disparity in having a USC among Koreans so that future research can better model Korean health access and health behavior.

Although the acculturation factors used in this study were well-documented to be associated with access, they were not very successful in explaining having a USC among this sample of Asian Americans. However, these findings should not undermine the importance of understanding the influence of acculturation on access to care among Asian Americans or discourage the use of acculturation variables. Instead, these findings suggest that acculturation factors used may not be the most appropriate proxies for understanding having a USC. Other measures such as language preference, interview language, ethnicity of friends, or adherence to traditional beliefs should be assessed for their potential influence on having a USC. Acculturation scales that are able to measure multiple dimensions of acculturation may be needed. Finally, many researchers also suggest that the use of proxy measures of acculturation over-simplify the barriers that confront immigrants.[61,131] These researchers suggest that the ambiguities in the concept and definition of acculturation should be clarified so that the structural and cultural forces underlying the association between acculturation and health can be examined.

This study largely did not find residence in a concordant neighborhood to have a significant association with having a USC. However, a key question in developing this indicator was how an ethnic enclave or neighborhood should be measured, specifically whether ethnicity or racial concordance had more of an influence on health behavior among Asian Americans and what cutoffs should be used for consideration of high and low concordance to a neighborhood. The results across the studies suggest that consideration of race versus ethnicity concordance was important. Although almost 30% of all Asians lived in racially concordant neighborhood in Manuscript 1 (Chapter 3), the association of having a USC using a general Asian race composition indicator may have been non-significant (and close to 1) since multiple Asian ethnicities living in the same neighborhood lack cultural and language concordance. The results

from ethnically concordant neighborhoods among all Asians from the second manuscript suggest that ethnicity concordance may be more informative since the magnitude of the association dropped considerably (odds ratio=0.62), though this relationship was also not significant. However, the second manuscript also suggest that the influence of neighborhood may vary by subgroups since Chinese adults living in an ethnically concordant neighborhood had lower odds of having a USC. Use of a higher cutoff to indicate concordance may have also limited the ability to observe difference by neighborhood, especially among smaller or more integrated populations such as Japanese and South Asians since none of the individuals sampled lived in a high concordance neighborhood based on the 40% cutoff. Future studies should explore other methods for developing an indicator for neighborhood, potentially focusing on comparisons of race and ethnicity concordance and consideration of other values for cutoffs and differing cutoffs by subgroup.

Finally, the need for more research using disaggregated Asian Americans. Although discussed as a policy implication, the need for disaggregated Asian American research bears repeating since it is vital for understanding complex health behaviors among this diverse population. The results from this study emphasize both important similarities and differences in health behavior among the different groups in key associations and pathways that influence access to care. The new ACA requirement on data collection to expand race/ethnicity will open up many research directions for understanding Asian American ethnic subgroups and their health behaviors by increasing the number of surveys that will collect information on Asian Americans and their ethnicities. The DHHS will also work to develop new sampling and reporting techniques to get information on the small ethnic groups and oversample among Asian Americans. While these efforts will take time to come to fruition, the increased sample size will allow for greater power to assess differences between the subpopulations so that variations in health and health behaviors can be identified and targeted.

Conclusions

With a rapidly increasing population in the US, the largely foreign-born Asian American population is extremely diverse and represents over almost 50 countries and ethnic groups with different languages, cultures, and traditions. Asian Americans also span the spectrum in their diversity in socioeconomic status. Although, Asian Americans are often considered the "model minority" in health and health behaviors, emerging research has shown disparities in health and health behaviors between Asian Americans and non-Hispanic whites and among the different ethnic subgroups. However, this growing and diverse population has largely been understudied and there is a pressing need to understand the access to care among Asian Americans.

This study addressed an important healthcare access issue and broadens the understanding of the variations and underlying mechanisms of having a USC among Asian Americans by assessing key predisposing characteristics, enabling resources, and acculturation factors. Study findings suggest that associations with having a USC is complex and varied by race and by ethnicity. Acculturation played a significant role in explaining the disparity in having a USC between Asians and non-Hispanic whites. However, acculturation did not contribute to the USC pathways, suggesting that the assessed acculturation factors played a limited role in the pathways to having a USC or that other aspects of acculturation should be studied. The Asian American ethnic subgroups (Chinese, Filipinos, Japanese, Koreans, Vietnamese, and South Asians) that were examined varied in having a USC and in the factors that influences the USC pathway. Researchers should measure and assess Asian Americans as a disaggregated population to better understand their differential risks in health and health behaviors. Policymakers should recognize the differential patterns and pathways to access among the different Asian American ethnic subgroups to support targeted, evidence-based decisions in policy and funding.

REFERENCES

1. U.S. Census Bureau. *U.S. interim projections by age, sex, race, and Hispanic origin. Table 1b*.; 2004. Available at: http://www.census.gov/ipc/www/usinterimproj/.

2. Reeves TJ, Bennett CE. *We the people: Asians in the United States*. Washington, D.C.; 2004. Available at: http://census.gov/prod/2004pubs/censr-17.pdf. Accessed August 24, 2011.

3. U.S. Census Bureau. Current Population Survey, annual social and economic supplement, 2011. 2012. Available at: http://www.census.gov/population/race/data/ppl-aa11.html.

4. Kuo J, Porter K. *Health status of Asian Americans: United States, 1992-94. Advance data from vital and health statistics; no. 298*. Hyattsville, Maryland. National Center for Health Statistics; 1997:1–16. Available at: http://www.ncbi.nlm.nih.gov/pubmed/10662349.

5. Chen MS. Cancer prevention and control among Asian: findings and recommendations. *Cancer*. 1998;83(8):1856–1864.

6. Hoeffel EM, Rastogi S, Kim MO, Shahid H. *The Asian population: 2010*. Washington, D.C.; 2012. Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:The+Asian+Population+:+2010#4. Accessed August 29, 2013.

7. U.S. Census Bureau. 2009-2011 American Community Survey. 2012. Available at: http://factfinder2.census.gov. Accessed September 28, 2012.

8. Centers for Disease Control and Prevention. CDC Health Disparities and Inequalities Report — United States , 2011. *Morb. Mortal. Wkly. Rep.* 2011;60.

9. U.S. Department of Health and Human Services. Access to care - Healthy People 2020. Available at: http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx?topicid=1. Accessed September 27, 2011.

10. Agency for Healthcare Research and Quality. *2012 National Healthcare Disparities Report. AHRQ publication no. 13-0003*. Rockville, MD; 2013.

11. Institute of Medicine. *Access to health care in America*. (Millman M, ed.). Washington, D.C.: National Academy Press; 1993. Available at: http://books.google.com/books?hl=en&lr=&id=juBLbxjbEXAC&oi=fnd&pg=PA1&dq=Access+to+Health+Care+in+America&ots=NohH_4Wc6x&sig=1h7AOMPJcFLGC_DTJcID0hIfppg. Accessed July 2, 2013.

12. Starfield B, Shi L. The medical home, access to care, and insurance: a review of evidence. *Pediatrics*. 2004;113:1493–1498. Available at: http://pediatrics.aappublications.org/cgi/content/abstract/113/Supplement_4/1493. Accessed December 29, 2011.

13. Agency for Healthcare Research and Quality. MEPS topic: usual source of care. 2009. Available at: http://meps.ahrq.gov/data_stats/MEPS_topics.jsp?topicid=44Z-1. Accessed September 9, 2013.

14. Xu KT. Usual source of care in preventive service use: a regular doctor versus a regular site. *Health Serv. Res.* 2002;37(6):1509–1529. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1464041&tool=pmcentrez&rendertype=abstract.

15. Blewett LA, Johnson PJ, Lee B, Scal PB. When a usual source of care and usual provider matter: adult prevention and screening services. *J. Gen. Intern. Med.* 2008;23(9):1354–1360. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2518015&tool=pmcentrez&rendertype=abstract. Accessed September 16, 2013.

16. Lambrew JM, DeFriese GH, Carey TS, Ricketts TC, Biddle AK. The effects of having a regular doctor on access to primary care. *Med. Care*. 1996;34(2):138–151. Available at: http://www.ncbi.nlm.nih.gov/pubmed/8632688.

17. Corbie-Smith G, Flagg EW, Doyle JP, O'Brien MA. Influence of usual source of care on differences by race/ethnicity in receipt of preventive services. *J. Gen. Intern. Med.* 2002;17(6):458–464. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1495054&tool=pmcentrez&rendertype=abstract.

18. Spatz ES, Ross JS, Desai MM, Canavan ME, Krumholz HM. Beyond insurance coverage: usual source of care in the treatment of hypertension and hypercholesterolemia. Data from the 2003-2006 National Health and Nutrition Examination Survey. *Am. Heart J.* 2010;160(1):115–21. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3025407&tool=pmcentrez&rendertype=abstract. Accessed January 19, 2012.

19. Taylor VM, Schwartz SM, Yasui Y, et al. Pap testing among Vietnamese women: health care system and physician factors. *J. Community Health*. 2004;29(6):437–450. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1811063&tool=pmcentrez&rendertype=abstract.

20. Xu KT, Borders TF. Does being an immigrant make a difference in seeking physician services? *J. Health Care Poor Underserved*. 2008;19(2):380–390. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18469411. Accessed April 22, 2013.

21. Tsai J, Shi L, Yu W-L, Lebrun LA. Usual source of care and the quality of medical care experiences: a cross-sectional survey of patients from a Taiwanese community. *Med. Care*. 2010;48(7):628–634. Available at: http://journals.lww.com/lww-medicalcare/Abstract/2010/07000/Usual_Source_of_Care_and_the_Quality_of_Medical.10.aspx. Accessed July 2, 2013.

22. Sox CM, Swartz K, Burstin HR, Brennan TA. Insurance or a regular physician: which is the most powerful predictor of health care? *Am. J. Public Health*. 1998;88(3):364–370. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1508345&tool=pmcentrez&rendertype=abstract.

23. DeVoe JE, Fryer GE, Phillips R, Green L. Receipt of preventive care among adults: insurance status and usual source of care. *Am. J. Public Health*. 2003;93(5):786–791. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1447840&tool=pmcentrez&rendertype=abstract.

24. Devoe JE, Tillotson CJ, Wallace LS, Lesko SE, Pandhi N. Is health insurance enough? A usual source of care may be more important to ensure a child receives preventive health counseling. *Matern. Child Health J.* 2011. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21373938. Accessed January 19, 2012.

25. Devoe JE, Tillotson CJ, Wallace LS. Usual source of care as a health insurance substitute for US adults with diabetes? *Diabetes Care*. 2009;32(6):983–989. Available at: http://care.diabetesjournals.org/content/32/6/983.short. Accessed July 2, 2013.

26. Agency for Healthcare Research and Quality. *2010 National Healthcare Disparities Report. AHRQ publication no. 11-0005*. Rockville, MD; 2011.

27. Centers for Disease Control and Prevention. Minority Health: Asian American populations. 2013. Available at: http://www.cdc.gov/minorityhealth/populations/REMP/asian.html. Accessed January 19, 2012.

28. Pleis JR, Ward BW, Lucas JW. Summary health statistics for U.S. adults: National Health Interview Survey, 2009. National Center for Health Statistics. *Vital Heal. Stat.* 2009;10(242). Available at: http://www.ncbi.nlm.nih.gov/pubmed/21905346.

29. Centers for Disease Control and Prevention. *Reported trends in tuberculosis, 2011*. Atlanta, GA; 2012.

30. American Lung Association. *State of Lung Disease in Diverse Communities 2010*. Washington, D.C.; 2010. Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:State+of+lung+disease+in+diverse+communities#0. Accessed July 3, 2013.

31. McCracken M, Olsen M, Chen MS, et al. Cancer incidence, mortality, and associated risk factors among Asian Americans of Chinese, Filipino, Vietnamese, Korean, and Japanese ethnicities. *CA. Cancer J. Clin.* 2007;57(4):190–205. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17626117.

32. Centers for Disease Control and Prevention. Health status of Cambodians and Vietnamese--selected communities, United States, 2001-2002. *Morb. Mortal. Wkly. Rep.* 2004;53(33):760–765.

33. Office of Minority Health. Cancer and Asians/Pacific Islanders. 2012. Available at: http://minorityhealth.hhs.gov/templates/content.aspx?lvl=2&lvlID=53&ID=3055. Accessed January 19, 2012.

34. Office of Minority Health. Heart disease and Asians and Pacific Islanders. Available at: http://minorityhealth.hhs.gov/templates/content.aspx?lvl=2&lvlID=53&ID=3060. Accessed January 19, 2012.

35. O'Connor PJ, Desai J, Rush WA, Cherney LM, Solberg LI, Bishop DB. Is having a regular provider of diabetes care related to intensity of care and glycemic control? *J. Fam. Pract.* 1998;47(4):290–297. Available at: http://www.ncbi.nlm.nih.gov/pubmed?Db=pubmed&Cmd=Retrieve&list_uids=9789515&dopt=abstractplus.

36. Office of Minority Health. Diabetes and Asians and Pacific Islanders. 2013. Available at: http://minorityhealth.hhs.gov/templates/content.aspx?lvl=2&lvlID=53&ID=3057. Accessed January 19, 2012.

37. Wen XJ, Balluz LS. Racial disparities in access to health care and preventive services between Asian Americans/Pacific Islanders and Non-Hispanic Whites. *Ethn. Dis.* 2010;20(3):290–295. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20828104. Accessed August 18, 2011.

38. Ku L, Matani S. Left out: immigrants' access to health care and insurance. *Health Aff.* 2001;20(1):247–256. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11194848.

39. Shi L, Macinko J. Changes in medical care experiences of racial and ethnic groups in the United States, 1996-2002. *Int. J. Heal. Serv.* 2008;38(4):653–670. Available at: http://baywood.metapress.com/openurl.asp?genre=article&id=doi:10.2190/HS.38.4.e. Accessed January 17, 2012.

40. Srinivasan S, Guillermo T. Toward improved health: disaggregating Asian American and Native Hawaiian/Pacific Islander data. *Am. J. Public Health*. 2000;90(11):1731–4. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1446402&tool=pmcentrez&rendertype=abstract.

41. Mays VM, Cochran SD, Barnes NW. Race, race-based discrimination, and health outcomes among African Americans. *Annu. Rev. Psychol.* 2007;58:201–225. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16953796. Accessed July 20, 2011.

42. Barnes PM, Adams PF, Powell-Griner E. *Health characteristics of the Asian adult population: United States, 2004-2006. Advance data from vital and health statistics; no 394*. National Center for Health Statistics. Hyattsville, MD; 2008. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18271366.

43. Yu SM, Huang ZJ, Singh GK. Health status and health services utilization among US Chinese, Asian Indian, Filipino, and other Asian/Pacific Islander children. *Pediatrics*. 2004;113(1):101–107. Available at: http://pediatrics.aappublications.org/content/113/1/101.short. Accessed August 15, 2011.

44. Yu SM, Huang ZJ, Singh GK. Health status and health services access and utilization among Chinese, Filipino, Japanese, Korean, South Asian, and Vietnamese children in California. *Am. J. Public Health*. 2010;100(5):823–30. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20299656. Accessed August 15, 2011.

45. Pourat N, Kagawa-Singer M, Breen N, Sripipatana A. Access versus acculturation: identifying modifiable factors to promote cancer screening among Asian American women. *Med. Care*. 2010;48(12):1088–1096. Available at: http://ann.sagepub.com/content/530/1/74.short. Accessed August 15, 2011.

46. Chen JY, Diamant AL, Kagawa-Singer M, Pourat N, Wold C. Disaggregating data on Asian and Pacific Islander women to assess cancer screening. *Am. J. Prev. Med.* 2004;27(2):139–145. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15261901. Accessed August 18, 2011.

47. Lin MK, Moskowitz JM, Kazinets G, Ivey SL, Kim Y, Mcdonnell DD. Adherence to pap test guidelines: Variation among Asians in California. *Ethn. Dis.* 2009;19:425–432.

48. Frisbie WP, Cho Y, Hummer RA. Immigration and the health of Asian and Pacific Islander adults in the United States. *Am. J. Epidemiol.* 2001;153(4):372–80. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11207155.

49. Nguyen D. The effects of sociocultural factors on older Asian Americans' access to care. *J. Gerontol. Soc. Work*. 2012;55(1):55–71. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22220993. Accessed February 14, 2013.

50. Ye J, Mack D, Fry-Johnson Y, Parker K. Health care access and utilization among US-born and foreign-born Asian Americans. *J. Immigr. Minor. Heal.* 2012;14(5):731–737. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22038126. Accessed February 14, 2013.

51. Song H-J, Han H-R, Lee J-E, et al. Does access to care still affect health care utilization by immigrants? Testing of an empirical explanatory model of health care utilization by Korean American immigrants with high blood pressure. *J. Immigr. Minor. Heal.* 2010;12(4):513–519. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19649709. Accessed October 19, 2011.

52. Leclere FB, Jensen L, Biddlecom AE. Health care utilization, family context, and adaptation among immigrants to the United States. *J. Health Soc. Behav.* 1994;35(4):370–384. Available at: http://www.ncbi.nlm.nih.gov/pubmed/7844331.

53. Salant T, Lauderdale DS. Measuring culture: a critical review of acculturation and health in Asian immigrant populations. *Soc. Sci. Med.* 2003;57(1):71–90. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12753817.

54. Esperat M, Inouye J, Gonzalez E, Owen D, Feng D. Health disparities among Asian Americans and Pacific Islanders. *Annu. Rev. Nurs. Res.* 2004;22:135–159. Available at: http://www.ingentaconnect.com/content/springer/arnr/2004/00000022/00000001/art00008. Accessed August 18, 2011.

55. Berry JW. Acculturation: Living successfully in two cultures. *Int. J. Intercult. Relations*. 2005;29:697–712. Available at: http://linkinghub.elsevier.com/retrieve/pii/S014717670500132X. Accessed August 15, 2011.

56. Zane N, Mak W. Major approaches to the measurement of acculturation among ethnic minority populations: A content analysis and an alternative empirical strategy. In: Chun KM, Balls Organista P, Marin G, eds. *Acculturation: Advances in Theory, Measurement, and Applied Research*. Washington, D.C.: American Psychological Association; 2003:39–60.

57. Kim G, Chiriboga DA, Jang Y, Lee S, Huang C-H, Parmelee P. Health status of older Asian Americans in California. *J. Am. Geriatr. Soc.* 2010;58(10):2003–2008. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20929469. Accessed August 21, 2011.

58. Tseng W. Social, Demographic, and Cultural Characteristics of Asian Americans. In: Trinh-Shevrin C, Islam NS, Rey MJ, eds. *Asian American Communities and Health: Context, research, policy, and action*. San Francisco, CA: Jossey-Bass; 2009:23–49.

59. Baker D. Conceptual parameters of acculturation within the Asian and Pacific Islander American populations: applications for nursing practice and research. *Nurs. Forum*. 2011;46(2):83–93. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21517881.

60. Lee S, Nguyen HA, Tsui J. Interview language: a proxy measure for acculturation among Asian Americans in a population-based survey. *J. Immigr. Minor. Heal.* 2011;13(2):244–252. Available at:

http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3056132&tool=pmcentrez&rendertype=abstract. Accessed August 15, 2011.

61. Abraído-Lanza AF, Armbrister AN, Flórez KR, Aguirre AN. Toward a theory-driven model of acculturation in public health research. *Am. J. Public Health*. 2006;96(8):1342–6. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1522104&tool=pmcentrez&rendertype=abstract. Accessed June 18, 2011.

62. Kao DT. Generational cohorts, age at arrival, and access to health services among Asian and Latino immigrant adults. *J. Health Care Poor Underserved*. 2009;20(2):395–414. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19395837. Accessed August 15, 2011.

63. Ryu H, Young WB, Kwak H. Differences in health insurance and health service utilization among Asian Americans: method for using the NHIS to identify unique patterns between ethnic groups. *Int. J. Health Plann. Manage.* 2002;17(1):55–68. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11963444. Accessed September 23, 2011.

64. Thamer M, Richard C, Casebeer AW, Ray NF. Health insurance coverage among foreign-born US residents: the impact of race, ethnicity, and length of residence. *Am. J. Public Health*. 1997;87(1):96–102. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1380772&tool=pmcentrez&rendertype=abstract.

65. Stevens G. Age at immigration and second language proficiency among foreign-born adults. *Lang. Soc.* 1999;28(04):555–578. Available at: http://www.journals.cambridge.org/abstract_S0047404599004030.

66. Ponce NA, Hays RD, Cunningham WE. Linguistic disparities in health care access and health status among older adults. *J. Gen. Intern. Med.* 2006;21(7):786–791. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1924691&tool=pmcentrez&rendertype=abstract. Accessed August 18, 2011.

67. Kandula NR, Wen M, Jacobs EA, Lauderdale DS. Low rates of colorectal, cervical, and breast cancer screening in Asian Americans compared with non-Hispanic whites: cultural influences or access to care? *Cancer*. 2006;107(1):184–192. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16721803. Accessed August 15, 2011.

68. Flores G, Tomany-Korman SC. The language spoken at home and disparities in medical and dental health, access to care, and use of services in US children. *Pediatrics*. 2008;121(6):e1703–14. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18519474. Accessed August 8, 2011.

69. Abe-Kim J, Takeuchi DT, Hong S, et al. Use of mental health-related services among immigrant and US-born Asian Americans: results from the National Latino and Asian American Study. *Am. J. Public Health*. 2007;97(1):91–8. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1716256&tool=pmcentrez&rendertype=abstract. Accessed July 18, 2011.

70. Shi L, Lebrun LA, Tsai J. The influence of English proficiency on access to care. *Ethn. Health*. 2009;14(6):625–642. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19953393. Accessed October 17, 2011.

71. Lee S, Choi S. Disparities in access to health care among non-citizens in the United States. *Heal. Sociol. Rev.* 2009;18(3):307–320. Available at: http://pubs.e-contentmanagement.com/doi/abs/10.5172/hesr.2009.18.3.307.

72. Lebrun LA. Effects of length of stay and language proficiency on health care experiences among immigrants in Canada and the United States. *Soc. Sci. Med.* 2012;74(7):1062–1072. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22326103. Accessed June 7, 2013.

73. Lopez-Class M, Castro FG, Ramirez AG. Conceptions of acculturation: a review and statement of critical issues. *Soc. Sci. Med.* 2011;72(9):1555–1562. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21489670. Accessed August 15, 2011.

74. Portes A, Zhou M. The new second generation: Segmented assimilation and its variants. *Ann. Am. Acad. Pol. Soc. Sci.* 1993;530(1):74–96. Available at: http://ann.sagepub.com/content/530/1/74.short. Accessed August 15, 2011.

75. Gaskin DJ, Dinwiddie GY, Chan KS, McCleary R. Residential segregation and disparities in health care services utilization. *Med. Care Res. Rev.* 2011. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21976416. Accessed October 15, 2011.

76. Ma GX, Daus GP. Health Interventions. In: Trinh-Shevrin C, Islam NS, Rey MJ, eds. *Asian American Communities and Health: Context, research, policy, and action*. San Francisco, CA: Jossey-Bass; 2009:443–463.

77. Haas JS, Phillips K a., Sonneborn D, et al. Variation in access to health care for different racial/ethnic groups by the racial/ethnic composition of an individual's county of residence. *Med. Care*. 2004;42(7):707–714. Available at: http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00005650-200407000-00012. Accessed August 15, 2011.

78. Choi JY. Contextual effects on health care access among immigrants: lessons from three ethnic communities in Hawaii. *Soc. Sci. Med.* 2009;69(8):1261–1271. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19720437. Accessed July 3, 2011.

79. Osypuk TL, Roux AVD, Hadley C, Kandula NR. Are immigrant enclaves healthy places to live? The Multi-ethnic Study of Atherosclerosis. *Soc. Sci. Med.* 2009;69(1):110–120. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2750873&tool=pmcentrez&rendertype=abstract. Accessed August 4, 2011.

80. DeNavas-Walt C, Proctor BD, Smith JC. *Income, poverty, and health insurance coverage in the United States: 2009*. Washington, D.C.: US Dept. of Commerce, Economics and Statistics Administration, US Census Bureau; 2010.

81. Reeves TJ, Bennett CE. *The Asian and Pacific Islander population in the United States: March 2002*. Washington, D.C.: US Dept. of Commerce, Economics and Statistics Administration, US Census Bureau; 2003. Available at: http://mhrc.dopm.uab.edu/resources_new/asianpop2002.pdf. Accessed August 22, 2011.

82. Henry J. Kaiser Foundation. *Health insurance coverage and access to care among Asian Americans and Pacific Islanders*.; 2000.

83. Ryu H, Young WB, Park C. Korean American health insurance and health services utilization. *Res. Nurs. Health*. 2001;24(6):494–505. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11746078.

84. Hahm HC, Lahiff M, Barreto RM, Shin S, Chen W-Y. Health care disparities and language use at home among Latino, Asian American, and American Indian adolescents: findings from the California Health Interview Survey. *J. Community Psychol.* 2008;36(1):20–34. Available at: http://onlinelibrary.wiley.com/doi/10.1002/jcop.20214/abstract. Accessed August 15, 2011.

85. Huang ZJ, Yu SM, Ledsky R. Health status and health service access and use among children in U.S. immigrant families. *Am. J. Public Health*. 2006;96(4):634–40. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1470552&tool=pmcentrez&rendertype=abstract. Accessed October 7, 2011.

86. Choi S. Longitudinal changes in access to health care by immigrant status among older adults: the importance of health insurance as a mediator. *Gerontologist*. 2011;51(2):156–169. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20693237. Accessed January 19, 2012.

87. Zhang W, McCubbin H, McCubbin L, et al. Education and self-rated health: an individual and neighborhood level analysis of Asian Americans, Hawaiians, and Caucasians in Hawaii. *Soc. Sci. Med.* 2010;70(4):561–569. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19932929. Accessed August 15, 2011.

88. Alegría M, Cao Z, McGuire TG, et al. Health insurance coverage for vulnerable populations: contrasting Asian Americans and Latinos in the United States. *Inquiry*. 2006;43(3):231–254. Available at: http://www.inquiryjournalonline.org/doi/pdf/10.5034/inquiryjrnl_43.3.231. Accessed August 18, 2011.

89. Schulman KA, Rubenstein LE, Chesley FD, Eisenberg JM. The roles of race and socioeconomic factors in health services research. *Health Serv. Res.* 1995;30(1 Pt 2):179–195. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1070048&tool=pmcentrez&rendertype=abstract.

90. Andersen RM, Aday LA. Access to medical care in the US: realized and potential. *Med. Care*. 1978;16(7):533–546. Available at: http://www.ncbi.nlm.nih.gov/pubmed/672266. Accessed September 27, 2011.

91. Viera A, Pathman D, Garrett J. Adults' lack of a usual source of care: a matter of preference? *Ann. Fam. Med.* 2006;4(4):359–365. Available at: http://annfammed.org/content/4/4/359.short. Accessed January 31, 2013.

92. Weinick RM, Drilea SK. Usual sources of health care and barriers to care, 1996. *Stat. Bull.* 1998;79(1):11–17. Available at: http://www.ncbi.nlm.nih.gov/pubmed/9476309. Accessed June 28, 2013.

93. Zuvekas SH, Taliaferro GS. Pathways to access: Health insurance, the health care delivery system, and racial/ethnic disparities, 1996-1999. *Health Aff.* 2003;22(2):139–153. Available at: http://content.healthaffairs.org/cgi/doi/10.1377/hlthaff.22.2.139. Accessed July 31, 2013.

94. Moy E, Bartman BA, Clancy CM, Cornelius LJ. Changes in usual sources of medical care between 1987 and 1992. *J. Health Care Poor Underserved*. 1998;9(2):126–139. Available at: http://muse.jhu.edu/content/crossref/journals/journal_of_health_care_for_the_poor_and_underserved/v009/9.2.moy.html. Accessed June 13, 2013.

95. Markides KS, Levin JS, Ray LA. Determinants of physician utilization among Mexican-Americans. *Med. Care*. 1985;23(3):236–246. Available at: http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=00005650-198503000-00005.

96. Weinick RM, Zuvekas SH, Cohen JW. Racial and ethnic differences in access to and use of health care services, 1977 to 1996. *Med. Care Res. Rev.* 2000;57(4):36–54. Available at: http://mcr.sagepub.com/cgi/doi/10.1177/107755800773743592. Accessed August 15, 2011.

97. Berki SE, Kobashigawa B. Socioeconomic and need determinants of ambulatory care use: path analysis of the 1970 Health Interview Survey data. *Med. Care*. 1976;14(5):405–421. Available at: http://www.ncbi.nlm.nih.gov/pubmed/1271881.

98. Xu Y, Pan W, Liu H. The role of acculturation in diabetes self-management among Chinese Americans with type 2 diabetes. *Diabetes Res. Clin. Pract.* 2011;93(3):363–370. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21636157. Accessed October 16, 2011.

99. Shen BJ, Takeuchi DT. A structural model of acculturation and mental health status among Chinese Americans. *Am. J. Community Psychol.* 2001;29(3):387–418. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11469114.

100. Ayers JW, Hofstetter CR, Usita P, Irvin VL, Kang S, Hovell MF. Sorting out the competing effects of acculturation, immigrant stress, and social support on depression: a report on Korean women in California. *J. Nerv. Ment. Dis.* 2009;197(10):742–7. Available at: http://www.ncbi.nlm.nih.gov/pubmed/19829202. Accessed October 16, 2011.

101. Choi S. A critical review of theoretical frameworks for health service use among older immigrants in the United States. *Soc. Theory Heal.* 2011;9(2):183–202. Available at: http://www.palgrave-journals.com/doifinder/10.1057/sth.2010.13. Accessed April 22, 2013.

102. Pourat N, Lubben J, Wallace SP, Moon A. Predictors of use of traditional Korean healers among elderly Koreans in Los Angeles. *Gerontologist*. 1999;39(6):711–9. Available at: http://www.ncbi.nlm.nih.gov/pubmed/10650681.

103. Ricketts TC, Goldsmith LJ. Access in health services research: the battle of the frameworks. *Nurs. Outlook*. 53(6):274–280. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16360698. Accessed August 23, 2011.

104. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J. Health Soc. Behav.* 1995;36(1):1–10. Available at: http://www.ncbi.nlm.nih.gov/pubmed/7738325.

105. Andersen RM, McCutcheon A, Aday LA, Chiu GY, Bell R. Exploring dimensions of access to medical care. *Health Serv. Res.* 1983;18(1):49–74. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1068709&tool=pmcentrez&rendertype=abstract.

106. Andersen RM, Harada N, Chiu V, Makinodan T. Application of the Behavioral Model to Health Studies of Asian and Pacific Islander Americans. *Asian Am. Pacific Islander J. Heal.* 1995;3(2):128–141. Available at: http://www.ncbi.nlm.nih.gov/pubmed/11567308.

107. Kuo T, Torres-Gil FM. Factors affecting utilization of health services and home- and community-based care programs by older Taiwanese in the United States. *Res. Aging*. 2001;23(1):14–36. Available at: http://roa.sagepub.com/cgi/doi/10.1177/0164027501231002. Accessed October 8, 2012.

108. Aroian KJ, Wu B, Tran T V. Health care and social service use among Chinese immigrant elders. *Res. Nurs. Health*. 2005;28(2):95–105. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15779058. Accessed September 28, 2011.

109. California Health Interview Survey. *CHIS 2009 Adult Survey*. Los Angeles, CA; 2011.

110. California Health Interview Survey. About CHIS. Available at: http://healthpolicy.ucla.edu/chis/.

111. California Health Interview Survey. *CHIS 2005 Adult Survey*. Los Angeles, CA; 2010.

112. California Health Interview Survey. *CHIS 2005 Methodology Series: Report 4 – Response Rates*. Los Angeles, CA; 2007.

113. California Health Interview Survey. *CHIS 2009 Methodology Series: Report 4 – Response Rates*. Los Angeles, CA; 2011.

114. California Health Interview Survey. *CHIS 2005 Methodology Series: Report 5 - weighting and variance estimation*. Los Angeles, CA; 2007.

115. California Health Interview Survey. *CHIS 2009 Methodology Series: Report 5 – weighting and variance estimation*. Los Angeles, CA; 2011.

116. UCLA: Statistical Consulting Group. Stata Library: Replicate weights. Available at: http://www.ats.ucla.edu/stat/stata/library/replicate_weights.htm.

117. Abanilla K. Personal communication. March 19, 2012.

118. Carrier E, Yee T, Holzwart RA. *Coordination between emergency and primary care physicians*. Washington, D.C.; 2011. Available at: http://www.nihcr.org/ED-Coordination.html. Accessed June 28, 2013.

119. Pitts SR, Carrier ER, Rich EC, Kellermann AL. Where Americans get acute care: increasingly, it's not at their doctor's office. *Health Aff.* 2010;29(9):1620–1629. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20820017. Accessed June 20, 2013.

120. Allen JP, Turner E. Ethnic residential concentrations in United States metropolitan areas. *Geogr. Rev.* 2005;95(2):267–285. Available at:

http://onlinelibrary.wiley.com/doi/10.1111/j.1931-0846.2005.tb00366.x/abstract. Accessed May 24, 2013.

121. Kline RB. *Principles and Practice of Structural Equation Modeling*. 2nd ed. New York, NY: The Guilford Press; 2005.

122. MacCallum RC, Austin JT. Applications of structural equation modeling in psychological research. *Annu. Rev. Psychol.* 2000;51:201–226. Available at: http://www.annualreviews.org/doi/abs/10.1146/annurev.psych.51.1.201. Accessed June 28, 2013.

123. Muthén LK, Muthén BO. *Mplus User's Guide. Sixth Edition*. Los Angeles, CA; 2010.

124. Byrne BB. *Structural Equation Modeling with Mplus: Basic concepts, applications, and programming*. New York, NY: Routledge, Taylor & Francis Group; 2012.

125. Muthén LK, Muthén BO. *Mplus User's Guide. Seventh Edition*. Los Angeles, CA; 2012.

126. Kenney DA. Measuring Model Fit. 2012. Available at: http://davidakenny.net/cm/fit.htm.

127. Wang J, Wang X. *Structural Equation Modeling: Applications using Mplus*. (John Wiley & Sons, ed.). Chichester, UK; 2012.

128. Humes KR, Jones NA, Ramirez RR. *Overview of race and Hispanic origin: 2010*. Washington, D.C.; 2011. Available at: http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Overview+of+Race+and+Hispanic+Origin+:+2010#0. Accessed November 3, 2011.

129. Ghosh C. A national health agenda for Asian Americans and Pacific Islanders. *J. Am. Med. Assoc.* 2010;304(12):1381–1382. Available at: http://jama.ama-assn.org/content/304/12/1381.short. Accessed August 8, 2013.

130. U.S. Census Bureau. Selected population profile in the United States. 2011 American Community Survey 1-year estimates. 2012. Available at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_11_1YR_S0201&prodType=table. Accessed September 28, 2012.

131. Hunt LM, Schneider S, Comer B. Should "acculturation" be a variable in health research? A critical review of research on US Hispanics. *Soc. Sci. Med.* 2004;59(5):973–986. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15186898. Accessed July 17, 2011.

132. U.S. Census Bureau. *The statistical abstract of the United States: 2012. Table 19*.; 2010. Available at: http://www.census.gov/compendia/statab/2012/tables/12s0019.pdf. Accessed October 21, 2011.

133. Ponce NA, Lavarreda SA, Yen W, Brown ER, DiSogra C, Satter DE. The California Health Interview Survey 2001: translation of a major survey for California's multiethnic population. *Public Health Rep.* 2004;119(4):388–395. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1497648&tool=pmcentrez&rendertype=abstract.

134. Cordasco KM, Ponce NA, Gatchell MS, Traudt B, Escarce JJ. English language proficiency and geographical proximity to a safety net clinic as a predictor of health care access. *J. Immigr. Minor. Heal.* 2011;13(2):260–267. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3056133&tool=pmcentrez&rendertype=abstract. Accessed September 28, 2011.

135. DuBard CA, Gizlice Z. Language spoken and differences in health status, access to care, and receipt of preventive services among US Hispanics. *Am. J. Public Health*. 2008;98(11):2021–8. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2636430&tool=pmcentrez&rendertype=abstract. Accessed August 15, 2011.

136. Brach C, Chevarley F. *Research findings #28: Demographics and health care access and utilization of limited-English-proficient and English-proficient Hispanics*. Rockville, MD; 2008.

137. Wallace SP, Gutiérrez VF, Castañeda X. Access to preventive services for adults of Mexican origin. *J. Immigr. Minor. Heal.* 2008;10(4):363–371. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17939052. Accessed March 22, 2013.

138. Alegría M, Mulvaney-Day N, Woo M, Torres M, Gao S, Oddo V. Correlates of past-year mental health service use among Latinos: results from the National Latino and Asian American Study. *Am. J. Public Health*. 2007;97(1):76–83. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1716237&tool=pmcentrez&rendertype=abstract. Accessed August 21, 2011.

139. Gresenz CR, Rogowski J, Escarce JJ. Community demographics and access to health care among U.S. Hispanics. *Health Serv. Res.* 2009;44(5):1542–1562. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2754547&tool=pmcentrez&rendertype=abstract. Accessed August 15, 2011.

140. Peake W, Marshall M. Exploring why the self-employed are less likely to have healthcare coverage: an empirical analysis. *Small Bus. Institute® J.* 2012;8(1):16–29. Available at: http://www.sbij.ecu.edu/index.php/SBIJ/article/view/132. Accessed January 15, 2013.

141. Perry C, Rosen H. *Insurance and the utilization of medical services among the self-employed*. Cambridge, MA; 2001. Available at: http://www.nber.org/papers/w8490. Accessed January 16, 2013.

142. Liao Y, Bang D, Cosgrove S, et al. Surveillance of health status in minority communities - Racial and Ethnic Approaches to Community Health Across the U.S. (REACH U.S.) risk factor survey, United States, 2009. *Morb. Mortal. Wkly. Rep.* 2011;60(SS06):1–44. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21597458.

143. Ponce NA. Health Insurance. In: Trinh-Shevrin C, Islam NS, Rey MJ, eds. *Asian American Communities and Health: Context, research, policy, and action*. San Francisco, CA: Jossey-Bass; 2009:345–363.

144. Lee JWR, Brancati FL, Yeh H-C. Trends in the prevalence of type 2 diabetes in Asians versus whites: results from the United States National Health Interview Survey, 1997-2008. *Diabetes Care*. 2011;34(2):353–357. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3024348&tool=pmcentrez&rendertype=abstract. Accessed October 31, 2012.

145. Palaniappan LP, Araneta MRG, Assimes TL, et al. Call to action: cardiovascular disease in Asian Americans: a science advisory from the American Heart Association. *Circulation*. 2010;122(12):1242–1252. Available at: http://www.ncbi.nlm.nih.gov/pubmed/20733105. Accessed October 31, 2012.

146. Taylor VM, Yasui Y, Burke N, et al. Pap testing adherence among Vietnamese American women. *Cancer Epidemiol. Biomarkers Prev.* 2004;13(4):613–619.

147. Shi L. Experience of primary care by racial and ethnic groups in the United States. *Med. Care*. 1999;37(10):1068–1077. Available at: http://www.ncbi.nlm.nih.gov/pubmed/10524373.

148. Logan JR, Zhang W, Alba RD. Immigrant enclaves and ethnic communities in New York and Los Angeles. *Am. Sociol. Rev.* 2002;67(2):299–322.

149. Cortes KE. Are refugees different from economic immigrants? Some empirical evidence on the heterogeneity of immigrant groups in the United States. *Rev. Econ. Stat.* 2004;86(2):465–480. Available at: http://www.mitpressjournals.org/doi/abs/10.1162/003465304323031058. Accessed May 29, 2013.

150. Sodowsky GR, Carey JC. Asian Indian immigrants in America: Factors related to adjustment. *J. Multicult. Couns. Devel.* 1987;15(3):129–141. Available at: http://onlinelibrary.wiley.com/doi/10.1002/j.2161-1912.1987.tb00388.x/full. Accessed June 3, 2013.

151. U.S. Census Bureau. *Asian/Pacific American Heritage Month: May 2013*. Washington, D.C.; 2013. Available at: http://www.census.gov/newsroom/releases/archives/facts_for_features_special_editions/cb13-ff09.html. Accessed August 24, 2011.

152. Ellis M, Wright R. The industrial division of labor among immigrants and internal migrants to the Los Angeles economy. *Int. Migr. Rev.* 1999;33(1):26–54. Available at: http://www.ncbi.nlm.nih.gov/pubmed/12294980.

153. The Historic Filipino Health Network. *Culture and health among Filipinos and Filipino-Americans in central Los Angeles*. Los Angeles, CA; 2007. Available at: http://w.mycalconnect.org/uploadedFiles/Publications/By_Topic/Disparities/General/Culture Health Among Filipinos.pdf. Accessed May 31, 2013.

154. Hamamoto D, Torres RD, eds. *New American Destinies: A Reader in Contemporary Asian and Latino Immigration*. New York, NY: Routledge; 1997.

155. Carrasquillo O, Carrasquillo AI, Shea S. Health insurance coverage of immigrants living in the United States: differences by citizenship status and country of origin. *Am. J. Public Health*. 2000;90(6):917–923. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1446276&tool=pmcentrez&rendertype=abstract.

156. U.S. Citizenship and Immigrant Services. Green Card Eligibility. 2011. Available at: http://www.uscis.gov/portal/site/uscis/menuitem.eb1d4c2a3e5b9ac89243c6a7543f6d1a/?vgnextoid=80f63a4107083210VgnVCM100000082ca60aRCRD&vgnextchannel=80f63a4107083210VgnVCM100000082ca60aRCRD.

157. California Department of Social Services. Getting Services. Available at: http://www.cdss.ca.gov/refugeeprogram/PG1548.htm. Accessed June 4, 2013.

158. Assistant Secretary for Planning and Evaluation. Summary of Immigrant Eligibility Restrictions Under Current Law. 2009. Available at: http://aspe.hhs.gov/hsp/immigration/restrictions-sum.shtml. Accessed June 5, 2013.

159. Mock J, McPhee SJ, Nguyen T, et al. Effective lay health worker outreach and media-based education for promoting cervical cancer screening among Vietnamese American women. *Am. J. Public Health*. 2007;97(9):1693–1700. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1963308&tool=pmcentrez&rendertype=abstract. Accessed November 16, 2012.

160. Lam TK, McPhee SJ, Mock J, et al. Encouraging Vietnamese-American women to obtain Pap tests through lay health worker outreach and media education. *J. Gen. Intern. Med.* 2003;18(7):516–524. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1494888&tool=pmcentrez&rendertype=abstract.

161. Centers for Disease Control and Prevention. *FY 2013 Full Year CR Operating Plan*. Baltimore, MD; 2013. Available at: http://www.cdc.gov/fmo/topic/Budget Information/appropriations_budget_form_pdf/FY2013_CDC_Full-Year_CR_Operating_Plan.pdf.

162. The White House. *Impact of the March 1st cuts on middle class families, jobs and economic security: California*. Washington, D.C.; 2013. Available at: http://www.whitehouse.gov/sites/default/files/docs/sequester-factsheets/California.pdf.

163. McDonough JE. Budget sequestration and the US health sector. *N. Engl. J. Med.* 2013;368(14):1269–1271. Available at: http://www.nejm.org/doi/full/10.1056/NEJMp1303266. Accessed June 5, 2013.

164. Organisation for Economic Co-operation and Development. Assessment and recommendations. In: *OECD Reviews of Health Care Quality: Korea 2012: Raising Standards*. OECD Publishing; 2012. Available at: http://www.oecd.org/health/qualityreviews.

165. Han H-R, Kang J, Kim KB, Ryu JP, Kim MT. Barriers to and strategies for recruiting Korean Americans for community-partnered health promotion research. *J. Immigr. Minor. Heal.* 2007;9:137–146. Available at: http://www.ncbi.nlm.nih.gov/pubmed/17186370. Accessed July 11, 2013.

166. Lillie-Blanton M, Hoffman C. The role of health insurance coverage in reducing racial/ethnic disparities in health care. *Health Aff.* 2005;24(2):398–408. Available at: http://www.ncbi.nlm.nih.gov/pubmed/15757923. Accessed November 13, 2012.

167. Zuvekas SH, Taliaferro GS. Pathways to access: health insurance, the health care delivery system, and racial/ethnic disparities, 1996-1999. *Health Aff.* 2003;22(2):139–153. Available at: http://content.healthaffairs.org/cgi/doi/10.1377/hlthaff.22.2.139. Accessed November 8, 2012.

168. U.S. Census Bureau. Selected population profile in the United States. 2009 American Community Survey 1-year estimates. Table S0201. 2009. Available at: http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_09_1YR_S0201&prodType=table. Accessed November 3, 2011.

169. Chang E, Chan KS, Han H-R. Effect of acculturation on variations in having a usual source of care in Asian Americans versus non-Hispanic whites in California.

170. Kirby JB, Taliaferro G, Zuvekas SH. Explaining racial and ethnic disparities in health care. *Med. Care*. 2006;44(5 Suppl):I64–172. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16625066.

171. Ponce NA, Ku L, Cunningham WE, Brown ER. Language barriers to health care access among Medicare beneficiaries. *Inquiry*. 2006;43(1):66–76. Available at: http://www.ncbi.nlm.nih.gov/pubmed/16838819.

172. Aday LA, Andersen RM. A framework for the study of access to medical care. *Health Serv. Res.* 1974;9(3):208–220. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1071804&tool=pmcentrez&rendertype=abstract.

173. Barringer HR, Takeuchi D, Xenos P. Education, occupational prestige, and income of Asian Americans. *Sociol. Educ.* 1990;63(1):27–43. Available at: http://www.jstor.org/stable/10.2307/2112895. Accessed April 22, 2013.

174. Mar D. Regional differences in Asian American earnings discrimination: Japanese, Chinese, and Filipino American earnings in California and Hawaii. *Amerasia J.* 1999;25(2):67–93. Available at: http://aascpress.metapress.com/index/T733024416163600.pdf. Accessed April 22, 2013.

175. Nee V, Sanders J. The road to parity: determinants of the socioeconomic achievements of Asian Americans. *Ethn. Racial Stud.* 1985. Available at: http://www.tandfonline.com/doi/abs/10.1080/01419870.1985.9993475. Accessed April 22, 2013.

176. Zeng Z, Xie Y. Asian Americans' earnings disadvantage reexamined: the role of place of education. *Am. J. Sociol.* 2004;109(5):1075–1108. Available at: http://www.jstor.org/stable/10.1086/381914. Accessed April 22, 2013.

177. Kim C, Sakamoto A. Have Asian American men achieved labor market parity with white men? *Am. Sociol. Rev.* 2010;75(6):934–957. Available at: http://asr.sagepub.com/cgi/doi/10.1177/0003122410388501. Accessed August 27, 2013.

178. Sakamoto A, Goyette K a., Kim C. Socioeconomic attainments of Asian Americans. *Annu. Rev. Sociol.* 2009;35(1):255–276. Available at: http://www.annualreviews.org/doi/abs/10.1146/annurev-soc-070308-115958. Accessed April 19, 2013.

179. Chang E, Chan KS, Han H-R. Determinants of usual source of care among Asian American ethnic adults in California.

180. Hayward RA, Bernard AM, Freeman HE, Corey CR. Regular source of ambulatory care and access to health services. *Am. J. Public Health*. 1991;81(4):434–438. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1405059&tool=pmcentrez&rendertype=abstract.

181. Bureau of Labor Statistics. Extended mass layoffs -- fourth quarter 2009. Annual totals -- 2009. *2010*. Available at: http://www.bls.gov/news.release/archives/mslo_02122010.htm. Accessed September 13, 2013.

182. National Center for Health Statistics. *Health, United States, 2012: with special feature on emergency care. Table 72*. Hyattsville, MD; 2013. Available at: http://www.cdc.gov/nchs/hus/contents2012.htm#072.

183. Davis KE, Branscome JM. *Employer-sponsored health insurance for large employers in the private sector, by industry classification, 2009. Statistical Brief #322*. Rockville, MD; 2011. Available at: http://www.meps.ahrq.gov/mepsweb/data_files/publications/st322/stat322.pdf.

184. Huang K, Carrasquillo O. The role of citizenship, employment, and socioeconomic characteristics in health insurance coverage among Asian subgroups in the United States. *Med. Care*. 2008;46(10):1093–1098. Available at: http://www.ncbi.nlm.nih.gov/pubmed/18815516.

185. Branscome JM, Davis KE. *Employer-sponsored health insurance for small employers in the private sector, by industry classification, 2009. Statistical Brief #321*. Rockville, MD; 2011. Available at: http://www.meps.ahrq.gov/mepsweb/data_files/publications/st321/stat321.pdf.

186. Niedzwiecki M, Duong TC. *Southeast Asian American statistical profile*. Washington, D.C.; 2004.

187. Berry JW. Immigration, Acculturation, and Adaptation. *Appl. Psychol.* 1997;46(1):5–34. Available at: http://www.catchword.com/cgi-bin/cgi?body=linker&ini=xref&reqdoi=10.1080/026999497378467.

188. Henry J. Kaiser Foundation. Status of state action on the Medicaid expansion decision, as of August 28, 2013. 2013. Available at: http://kff.org/medicaid/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-act/.

189. Rasmussen PW, Collins SR, Doty MM, Garber T. *In states' hands: how the decision to expand Medicaid will affect the most financially vulnerable Americans. Commonwealth Fund pub.1702*. New York, NY; 2013.

190. Trinh-Shevrin C, Islam NS, Rey MJ, eds. *Asian American Communities and Health: Context, research, policy, and action*. 1st ed. San Francisco, CA: John Wiley & Sons; 2009.

191. Yoo G, Kim B. Korean immigrants and health care access: implications for the uninsured and underinsured. *Res. Sociol. Health Care*. 2008;25:77–94. Available at:

http://www.emeraldinsight.com/books.htm?chapterid=1758407. Accessed September 16, 2013.

192. Gellert GA, Maxwell RM, Higgins K V, Mai KK, Lowery R. Barriers to health care access and utilization among Vietnamese Americans in southern California. *Health Place*. 1995;1(2):91–99. Available at: http://linkinghub.elsevier.com/retrieve/pii/135382929500012B.

193. Initiative on Asian Americans and Pacific Islanders: about the White House Initiative on Asian Americans and Pacific Islanders. 2013. Available at: http://www.whitehouse.gov/administration/eop/aapi/about. Accessed September 4, 2013.

194. White House Initiative on Asian Americans and Pacific Islanders. *Continuing progress for the Asian American and Pacific Islander community, federal agency accomplishments*.; 2013. Available at: http://www.ed.gov/edblogs/aapi/files/2013/02/Continuing-Progress-for-the-Asian-American-and-Pacific-Islander-Community-1.pdf.

195. U.S. Department of Health and Human Services. The Affordable Care Act and Asian Americans and Pacific Islanders. Fact sheet. 2013. Available at: http://www.hhs.gov/healthcare/facts/factsheets/2012/05/asian-americans05012012a.html. Accessed August 8, 2013.

196. Henry J. Kaiser Foundation. *Impact of the Medicaid expansion for low-income Asians and Pacific Islanders across states*.; 2013.

197. Covered California. *Enrollment forecasts, reporting schedule and background data. Fact sheet.*; 2013.

198. Maxwell J, Cortés DE, Schneider KL, Graves A, Rosman B. Massachusetts' health care reform increased access to care for Hispanics, but disparities remain. *Health Aff*. 2011;30(8):1451–1460. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21821562. Accessed September 18, 2013.

199. Hoefer M, Rytina N, Baker B. *Estimates of the unauthorized immigrant population residing in the United States: January 2011*.; 2011.

200. Ghosh C. Healthy People 2010 and Asian Americans/Pacific Islanders: defining a baseline of information. *Am. J. Public Health*. 2003;93(12):2093–2098. Available at: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1448158&tool=pmcentrez&rendertype=abstract.

201. *Patient Protection and Affordable Care Act, 42 U.S.C. § 18001 et seq.*; 2010. Available at: http://www.gpo.gov/fdsys/pkg/CREC-2009-11-19/pdf/CREC-2009-11-19-pt1-PgS11607-3.pdf#page=127.

202. U.S. Department of Health and Human Services. News Release: Affordable Care Act to improve data collection, reduce health disparities. 2011. Available at: http://www.hhs.gov/news/press/2011pres/06/20110629a.html.

203. U.S. Department of Health and Human Services. *HHS Plan for Asian American, Native Hawaiian and Pacific Islander (AANHPI) Health*. Washington, D.C.; 2012. Available at: http://minorityhealth.hhs.gov/templates/browse.aspx?lvl=3&lvlid=573.

204. Kaneshiro B, Geling O, Gellert K, Millar L. The challenges of collecting data on race and ethnicity in a diverse, multiethnic state. *Hawaii Med. J.* 2011;70:168–171. Available at: http://www.hawaiimedicaljournal.org/HMJ_Aug11.pdf#page=13. Accessed August 15, 2011.

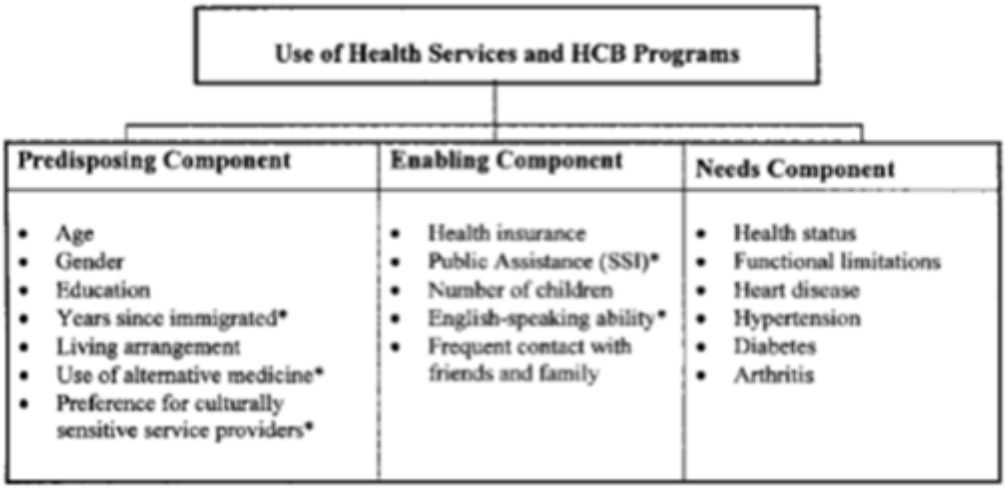
205. U.S. Department of Health and Human Services. Think Cultural Health - CLAS & the CLAS Standards. 2013. Available at: https://www.thinkculturalhealth.hhs.gov/Content/clas.asp. Accessed September 5, 2013.

206. Revisions to the standards for the classification of federal data on race and ethnicity. *Fed. Regist.* 1997. Available at: http://www.whitehouse.gov/omb/fedreg_1997standards. Accessed August 24, 2011.

207. American Anthropological Association. Response to OMB Directive 15: race and ethnic standards for federal statistics and administrative reporting: updated 9/18/00. Available at: http://www.aaanet.org/gvt/ombdraft.htm. Accessed August 24, 2011.

APPENDICES

Appendix A: A modified Andersen Behavioral Model used for service utilization of health services and home- and community-based program by older Taiwanese



Source: Kuo and Torres-Gil, 2001[107]

Appendix B. Study Variables, Descriptions and Coding

Variable	Study	Var. Type	Variable Description and Coding
Dependent variable			
Having a USC	all	binary	Having a usual source of care other than the ER 0. No, 1. Yes
Key Independent Variable			
Race/ethnicity	1	Binary	Self-reported race/ethnicity 0. Non-Hispanic white, 1. Asian
	2,3	Categorical	1. Chinese, 2. Filipino, 3. Japanese, 4. Korean, 5. Vietnamese, 6. South Asian, 7. Other Asian
Key Predisposing Characteristic			
Educational attainment	1,2	Categorical	Highest grade of education achieved 1. Some graduate school or more, 2. College degree, 3. Some college, Associates degree, or vocational school, 4. High school graduate or GED, 5. Less than high school
	3	Categorical	1. Less than high school, 2. High school graduate or GED, 3. Some college, Associates degree or vocational school, 4. College degree, 5. Some graduate school or more
Key Enabling Factors			
Insurance status	1,2	Categorical	Type of current health insurance 1. Employment-based, 2. Other private, 3. Medi-Cal (Medicaid), 4. Other public, 5. Uninsured
	3	Binary	0. Not insured, 1. Insured
Employment status	1,2	Categorical	Working status 1. Employed (other than self-employed), 2. Self-employed, 3. Unemployed, 4. Not in labor force
	3	Categorical	Household working status (interviewee and spouse) 1. Unemployed, 2. Working, part-time, 3. Working, full-time
Annual household income	1,2	Categorical	Household poverty level 1. 300%+ Federal Poverty Level (FPL), 2. 200-299% FPL, 3. 100-199% FPL, 4. 0-99% FPL
	3	Continuous	Household poverty level as times 100% FPL
Need			
Health status	1,2	Binary	Health condition of respondent 0. Excellent/Very Good/Good, 1. Fair/Poor
	3	Categorical	1. Poor, 2. Fair, 3. Good, 4. Very good, 5. Excellent
Acculturation Factors			
Length of time in the US	1,2	Categorical	Years lived in the US/nativity 1. US born, 2. Recent immigrant (<5 years), 3. Mid-tenure immigrant (5-14 years), 4. Long tenure immigrant (15+ years)
	3	Categorical	1. Recent immigrant (<5 years), 2. Mid-tenure immigrant (5-14 years), 3. Long tenure immigrant (15+ years), 4. US born

Variable	Study	Var. Type	Variable Description and Coding
English proficiency	1,2	Categorical	How well English is spoken 0. Limited proficiency (Not well, Not at all) 1. High proficiency (English only, Very well, Well)
	3	Categorical	1. Not at all, 2. Not well, 3. Well, 4. Very well, 5. English only
Residence in a concordant neighborhood	1	Binary	Residing in a racially concordant neighborhood 0. No (resident census tract <40% concordant), 1. Yes (resident census tract ≥40% concordant)
	2,3	Binary	Residing in an ethnically concordant neighborhood 0. No (resident census tract <40% concordant), 1. Yes (resident census tract ≥40% concordant)
Demographic/Predisposing variables			
Age	1,2	Categorical	Age of respondent 1. 18-24 years, 2. 25-34 years, 3. 35-44, 4. 45-54, 6. 55-64 years
	3	Continuous	
Gender	all	Binary	Gender of respondent 0. Male, 1. Female
Marital status	1,2	Binary	Marital status of respondent 0. Married, 1. Not married
	3	Binary	0. Not married, 1. Married
Household size	1,2	Categorical	Size of respondent's household 1. 1 person, 2. 2 persons, 3. 3 persons, 4. 4 persons, 5. 5+ persons
	3	n/a	
Survey year	1,2	Binary	Year survey was administered 0. 2005, 1. 2009

Appendix C: Unweighted Counts of the Sample Population

While no trends should be observed from the unweighted sample counts, the cell counts provide an indication to when results may be less robust or underpowered for certain groups.

Table C.1 presents the unweighted sample counts of the predisposing, enabling, and acculturation factors by having a usual source of care for the combined 2005 and 2009 California Health Interview Survey (CHIS) used in first manuscript of this dissertation. There was a total of 46,121 respondents who self-reported non-Hispanic white (n=38,555) or Asian (n=7, 566). Looking at sample sizes by race (Asian or White) and by having a USC, all cells have sufficient sample size.

Table C.2 presents the unweighted sample counts of the predisposing, enabling, and acculturation factors for 2005 and 2009 CHIS by race/ethnicity used in the first and second manuscripts of this dissertation. A few of the cells have small cell sizes (n<11), particularly among Japanese and South Asians. Cells with small sample size include: Japanese with less than high school (n=6), Japanese with other public insurance (n=10), Japanese living in an ethnically concordant census tract (n=0), South Asians with other public insurance (n=6), and South Asians living in an ethnically concordant census tract (n=5). To address these small sample sizes, variables and categories have been collapsed or removed from the ethnicity-specific logistic regression models. For the Japanese regression model, individuals with less than high school have been collapsed into the high school/GED category to make a new comparison group (high school graduate or less), and those with other public insurance have been included in the Medi-Cal (Medicaid) category to make a new comparison group (any public insurance), and the variable living in an ethnically concordant census tract was removed. For the South Asian regression model, those with other public insurance have been included in the Medi-Cal (Medicaid) category to make a new comparison group (any public insurance), and the variable living in an ethnically concordant census tract was removed.

Table C.3 and Table C.4 presented the unweighted sample counts of the predisposing, enabling, and acculturation factors by having a USC and for all Asians and by Asian subgroup for the 2009 CHIS used in third manuscript of this dissertation. In Mplus, ordered categorical mediating variables are treated as an underlying latent response variable. This is applicable for the enabling and acculturation variables. Although presented as a categorical variable in the table to show the spread, annual household income is used as a continuous variable. There was a total of 4,021 respondents who self-reported Asian in 2009. Sample sizes appear to be sufficient in Table C.3. Small sample sizes for Filipino, Japanese, and South Asian were found in categories for educational attainment, employment status, English proficiency, length of residence, and living in a concordant census tract in Table C.4. Due to these sample size limitations, these subgroups were not used in the analysis in manuscript 3. Manuscript 3 (Chapter 5) used the entire Asian population and then looked specifically at the Chinese, Korean and Vietnamese populations.

Table C.1 Unweighted counts of study variables by race and having a usual source of care (USC), 2005 and 2009 CHIS

	Total Sample		Asians		Whites	
Variables	**No USC**	**USC**	**No USC**	**USC**	**No USC**	**USC**
Total N	4,813	41,308	1,173	6,393	3,640	34,915
Predisposing						
Educational attainment						
Some graduate school or more	672	9,227	166	1,531	506	7,696
College degree	1,254	12,046	344	2,175	910	9,871
Some college/AA/vocational school	1,245	11,161	237	1,138	1,008	10,023
High school graduate/GED	1,306	7,495	298	1,095	1,008	6,400
Less than high school	336	1,379	128	454	208	925
Enabling						
Employment status						
Employed	2,451	24,522	582	4,030	1,869	20,492
Self-employed	930	5,931	147	664	783	5,267
Unemployed	471	1,423	124	306	347	1,117
Not in labor force	961	9,432	320	1,393	641	8,039
Insurance status						
Employment-based	1,569	29,570	353	4,327	1,216	25,243
Other private	532	4,205	119	582	413	3,623
Medi-Cal (Medicaid)	425	2,920	120	633	305	2,287
Other public	136	1,704	27	177	109	1,527
Uninsured	2,151	2,909	554	674	1,597	2,235
Household income						
300%+ FPL	2,381	30,368	478	4,018	1,903	26,350
200-299% FPL	725	4,426	161	798	564	3,628
100-199% FPL	966	4,057	288	879	678	3,178
<100 % FPL	741	2,457	246	698	495	1,759
Acculturation						
English proficiency						
High	4,345	39,694	727	4,846	3,618	34,848
Low	468	1,614	446	1,547	22	67
Length of residence in the US						
US born	3,540	33,561	255	1,451	3,285	32,110
Recent immigrant	232	508	178	349	54	159
Mid-tenure immigrant	369	1,832	281	1,314	88	518
Long-tenure immigrant	672	5,407	459	3,279	213	2,128
Lives in racially concordant census tract (≥40%)[a]						
No	1,870	12,679	1,078	5,976	792	6,703
Yes	2,943	28,628	95	417	2,848	28,211
Control variables						
Age						
18-24 years	700	2,114	231	538	469	1,576
25-34 years	922	4,276	212	976	710	3,300
35-44 years	1,004	8,689	270	1,795	734	6,894
45-54 years	1,203	12,534	258	1,760	945	10,774
55-64 years	984	13,695	202	1,324	782	12,371
Gender						
Male	2,666	16,891	599	2,644	2,067	14,247
Female	2,147	24,417	574	3,749	1,573	20,668
Marital status						
Married	1,792	25,095	603	4,434	1,189	20,661

Variables	Total Sample		Asians		Whites	
	No USC	USC	No USC	USC	No USC	USC
Not married	3,021	16,213	570	1,959	2,451	14,254
Household size						
1 person	1,167	8,175	155	676	1,012	7,499
2 persons	1,395	13,786	270	1,438	1,125	12,348
3 persons	935	7,759	255	1,556	680	6,203
4 persons	773	7,484	264	1,714	509	5,770
5+ persons	543	4,104	229	1,009	314	3,095
Health status						
Excellent/Very good/Good	4,024	35,897	864	5,051	3,160	30,846
Fair/Poor	789	5,411	309	1,342	480	4,069
Survey year						
2005	2,272	21,038	475	3,070	1,797	17,968
2009	2,541	20,270	698	3,323	1,843	16,947

a. Total sum of individuals by USC does not sum because one non-Hispanic white with a USC did not match on census tract.

Table C.2 Unweighted counts of study variables by race/ethnicity, 2005 and 2009 CHIS

Variables	White	Asian	Chinese	Filipino	Japanese	Korean	Vietnamese	South Asian	Other Asian
Total N	38,555	7,566	1,918	882	467	1,138	1,552	740	869
Having a usual source of care other than ER									
No	3,640	1,173	227	103	55	295	279	78	136
Yes	34,915	6,393	1,691	779	412	843	1,273	662	733
Predisposing									
Educational attainment									
Some graduate school or more	8,202	1,697	607	98	116	257	121	349	149
College degree	10,781	2,519	600	395	187	460	382	244	251
Some college/AA/vocational school	11,031	1,375	279	225	106	159	307	74	225
High school graduate/GED	7,408	1,393	295	140	52	208	455	59	184
Less than high school	1,133	582	137	24	6	54	287	14	60
Enabling									
Employment status									
Employed	22,361	4,612	1,244	660	277	511	884	486	550
Self-employed	6,050	811	208	55	58	226	101	76	87
Unemployed	1,464	430	79	44	15	48	139	35	70
Not in labor force	8,680	1,713	387	123	117	353	428	143	162
Insurance status									
Employment-based	26,459	4,680	1,295	631	374	507	757	566	550
Other private	4,036	701	217	55	39	159	91	67	73
Medi-Cal (Medicaid)	2,592	753	115	63	17	60	382	29	87
Other public	1,636	204	32	48	10	21	52	6	35
Uninsured	3,832	1,228	259	85	27	391	270	72	124
Household income									
300%+ FPL	28,253	4,496	1,234	580	369	637	568	578	530
200-299% FPL	4,192	959	212	121	49	190	218	64	105
100-199% FPL	3,856	1,167	285	125	32	200	358	55	112
<100 % FPL	2,254	944	187	56	17	111	408	43	122
Acculturation									
English proficiency									
High	38,466	5,573	1,408	851	435	587	793	715	784
Low	89	1,993	510	31	32	551	759	25	85
Length of residence in the US									
US born	35,395	1,706	392	252	324	111	99	57	471

Variables	White	Asian	Chinese	Filipino	Japanese	Korean	Vietnamese	South Asian	Other Asian
Recent immigrant	213	527	131	65	12	124	90	88	17
Mid-tenure immigrant	606	1,595	466	125	31	286	342	269	76
Long-tenure immigrant	2,341	3,738	929	440	100	617	1,021	326	305
Lives in racially concordant census tract (≥40%)[a]									
No	7,495	5,276	-	-	-	-	-	-	-
Yes	31,059	2,290	-	-	-	-	-	-	-
Lives in ethnically concordant census tract (≥40%)									
No	-	7,054	1,651	856	467	1,095	1,381	735	869
Yes	-	512	267	26	0	43	171	5	0
Control variables									
Age									
18-24 years	2,045	769	155	97	16	96	183	64	158
25-34 years	4,010	1,188	302	151	34	147	163	203	188
35-44 years	7,628	2,065	493	228	102	367	405	241	229
45-54 years	11,719	2,018	556	229	169	295	444	140	185
55-64 years	13,153	1,526	412	177	146	233	357	92	109
Gender									
Male	16,314	3,243	817	345	190	387	755	381	368
Female	22,241	4,323	1,101	537	277	751	797	359	501
Marital status									
Married	21,850	5,037	1,315	531	292	850	1,030	573	446
Not married	16,705	2,529	603	351	175	288	522	167	423
Household size									
1 person	8,511	831	220	93	104	115	120	59	120
2 persons	13,473	1,708	464	201	135	263	257	163	225
3 persons	6,883	1,811	511	190	109	288	338	193	182
4 persons	6,279	1,978	492	207	83	339	450	224	183
5+ persons	3,409	1,238	231	191	36	133	387	101	159
Health status									
Excellent/Very good/Good	34,006	5,915	1,566	760	426	837	898	695	733
Fair/Poor	4,549	1,651	352	122	41	301	654	45	136
Survey year									
2005	19,765	3,545	1,067	519	246	498	400	378	437
2009	18,790	4,021	851	363	221	640	1,152	362	432

a. Total sum of individuals by USC does not sum because one non-Hispanic white with a USC did not match on census tract.

Table C.3 Unweighted counts of study variables having a USC for all Asians, 2009 CHIS

	Asian	
Variables	**No USC**	**USC**
Total N	698	3,323
Predisposing		
Educational attainment		
Less than high school	84	250
High school graduate/GED	189	565
Some college/AA/vocational school	138	572
College degree	192	1,135
Some graduate school or more	95	801
Enabling		
Employment status		
Unemployed	69	146
Working, part-time	202	617
Working, full-time	427	2,560
Insured		
No	307	340
Yes	391	2,983
Household income		
<100 % FPL	177	398
100-199% FPL	181	471
200-299% FPL	92	437
300%+ FPL	248	2,017
Acculturation		
English proficiency		
Not at all	37	88
Not well	248	757
Well	195	930
Very well	100	707
English only	118	841
Length of residence in the US		
Recent immigrant	93	152
Mid-tenure immigrant	160	595
Long-tenure immigrant	300	1,832
US born	145	744
Lives in ethnically concordant census tract (≥40%)		
No	641	3,105
Yes	57	218
Control variables		
Age, mean (SD)	40.9 (14.1)	44.4 (12.1)
Gender		
Male	343	1,409
Female	355	1,914
Marital status		
Not married	341	1,005
Married	357	2,318
Health status		
Excellent	51	205
Very good	163	553
Good	233	997
Fair	142	969
Poor	109	599

Table C.4 Unweighted counts of study variables all Asians, Chinese, Koreans and Vietnamese, 2009 CHIS

Variables	Asian	Chinese	Filipino	Japanese	Korean	Vietnamese	South Asian
Total N	4,021	851	363	221	640	1,152	362
Having a usual source of care other than ER							
No	698	96	50	24	174	245	40
Yes	3,323	755	313	197	466	907	322
Predisposing							
Educational attainment							
Less than high school	334	52	12	3	26	198	8
High school graduate/GED	754	115	61	20	111	330	32
Some college/AA/vocational school	710	117	79	50	80	239	40
College degree	1,327	271	164	87	271	290	112
Some graduate school or more	896	296	47	61	152	95	170
Enabling							
Employment status							
Unemployed	215	40	10	7	24	84	13
Working, part-time	819	157	61	42	135	295	35
Working, full-time	2,987	654	292	172	481	773	314
Insured							
No	647	105	27	15	216	194	34
Yes	3,374	746	336	206	424	958	328
Household income							
<100 % FPL	575	81	19	11	69	302	19
100-199% FPL	652	124	54	17	107	263	30
200-299% FPL	529	94	58	17	102	168	35
300%+ FPL	2,265	552	232	176	362	419	278
Acculturation							
English proficiency							
Not at all	125	21	0	0	25	76	1
Not well	1,005	177	13	9	280	467	9
Well	1,125	297	91	16	168	375	100
Very well	807	160	100	24	88	169	192
English only	959	196	159	172	79	65	60
Length of residence in the US							
Recent immigrant	245	45	20	6	64	67	32
Mid-tenure immigrant	755	166	53	10	155	214	120

Variables	Asian	Chinese	Filipino	Japanese	Korean	Vietnamese	South Asian
Long-tenure immigrant	2,132	436	178	43	352	790	178
US born	889	204	112	162	69	81	32
Lives in ethnically concordant census tract (≥40%)							
No	3,746	733	353	221	618	1,030	359
Yes	275	118	10	0	22	122	3
Control variables							
Age, mean (SD)	43.8 (12.5)	44.8 (12.3)	44.5 (13.0)	49.4 (10.0)	44.3 (11.9)	44.0 (12.8)	40.4 (11.3)
Gender							
Male	1,752	368	148	92	203	570	187
Female	2,269	483	215	129	437	582	175
Marital status							
Not married	1,346	281	136	88	167	385	84
Married	2,675	570	227	133	473	767	278
Health status							
Excellent	256	18	21	4	45	140	6
Very good	716	120	37	14	131	337	18
Good	1,230	250	109	63	234	342	104
Fair	1,111	306	127	81	138	211	130
Poor	708	157	69	59	92	122	104

CURRICULUM VITAE

Eva Chang, MPH

PERSONAL DATA

Johns Hopkins Bloomberg School of Public Health
Department of Health Policy and Management
624 N. Broadway, Hampton House 610
Baltimore, MD 21202
(410) 955-6888

EDUCATION

Ph.D.	**Johns Hopkins Bloomberg School of Public Health**, Health Policy and Management, expected in 2013 Dissertation title: *Access to care in Asian Americans: Assessing determinants of usual source of care*
M.P.H.	**Yale University School of Public Health**, Global Health, May 2007
B.A.	**University of California, Berkeley**, Integrative Biology (Minor: Business Administration), May 2003

PROFESSIONAL EXPERIENCE

2013-present **Research Assistant**, Lipitz Center for Integrated Care, Health Policy and Management Department, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
PI: Dr. Karen Davis

- Assist in research related to payment innovation and cost issues for Medicare recipients.
- Compare health system performance of the US compared to 10 other OECD nations

2010-2013 **Research Assistant**, Health Policy and Management Department, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
PI: Dr. Kitty Chan
Project Title: An Index of Medical Test Overuse using Claims Data

- Conducting environmental scan on measures of overuse.
- Assist in identifying and developing overuse indicators and an index to measure systematic overuse using Medicare claims data.

Project Title: Data analyses of consumer and provider satisfaction surveys

- Validation of satisfaction in provider and consumer satisfaction surveys for a mental health services payer.
- Develop prediction models to examine socio-demographic trends in mental health services utilization, experiences and satisfaction with services among consumer.
- Completed multiple imputation by chained equations (MICE), factor analysis, multivariate analysis, and multi-level analysis.

2011-2012 **Research Assistant**, International Health Department, Johns Hopkins Bloomberg

School of Public Health, Baltimore, MD
PI: Dr. Joel Gittelsohn

- Managing and conducting statistical analyses involving several community-level studies on knowledge and behavior changes in food and nutrition.
- Calculate statistical power for various types of complex study designs.

Summers 2012 and 2010 **Program Analyst-Student Temporary Employment Program**, Center for Quality Improvement and Patient Safety, Agency for Healthcare Research and Quality, Rockville, MD

- Contributing author to the National Healthcare Quality and Disparity Reports for changes in functional gain using the inpatient rehabilitation facility patient assessment instrument (IRF-PAI), and access and effectiveness of care among minority populations.
- Assess relationship between hospital quality and primary language in California hospitals using HCUP data.
- Examine cardiovascular disease risk and use of preventive measures among Hispanic and Asian American ethnic subgroups in California.
- Data analysis and factor analysis of Nursing Home Consumer Assessment of Healthcare Providers and Systems (CAHPS) for long-stay nursing home patients in Maryland.
- Mentored by Drs. Ernest Moy and Judith Sangl

Summer 2011 **Graduate Student Intern**, Graduate Student Internship Program (GSIP), HRSA Maternal and Child Health Information Resource Center
Family Health Services Division of Hawai'i Department of Health, Honolulu, HI

- Analyzed Pregnancy Risk Assessment Monitoring System (PRAMS) data to determine associations between pregnancy-related health services utilization (postnatal and postpartum visits) and racial/ethnic populations.
- Combined and analyzed 2004-2009 Behavioral Risk Factor Surveillance System (BRFSS) data from California and Hawaii to determine associations between minority race/ethnicity groups and access to care.

2007-2009 **Analyst** in Pharmacoeconomics, Outcomes Research, and Epidemiology, Analysis Group, Boston, MA

- Worked on wide ranging outcomes research studies such as cost-of illness, burden-of-illness, and cost-effectiveness that encompass multiple study designs such as retrospective claims database analysis, clinical trial analysis, medical chart review, and cost-effectiveness analysis.
- Responsible for all aspects of research studies including speaking with clients; proposal writing; study design; query, cleaning, management and analysis of clinical databases using SAS and Excel; abstract and manuscript drafting.
- Project topics included: multiple myeloma, renal cell carcinoma, hypertension, preeclampsia, and psoriasis.

Summer 2007 **Research Assistant**, Yale University School of Public Health, New Haven, CT
PI: Dr. Elizabeth Bradley

- Revised course readings and PowerPoint slides for a Yale undergraduate course discussing health care delivery, financing, regulation, and disparities in the US.
- Managed the Door-to-Balloon Alliance database and analyzed existing and potential strategies in over 900 hospitals to improve prompt treatment in myocardial infarction patients.

PI: Dr. Hong Wang

- Collected, summarized, and evaluated current literature and projects on various global health topics such as tobacco and economic impact of health financing systems.

2006-2007 **Policy Fellow**, Connecticut Health Policy Project, New Haven, CT

- Researched health policy issues including healthcare financing, price controls on health services and prescription drugs, and pay-for-performance schemes that would be relevant for individuals and small businesses to write health policymaker issue briefs and consumer fact sheets on topics relevant to Connecticut's healthcare.
- Measured associations between cancer and insurance status using National Health Interview Survey (NHIS) data.

Summer 2006 and **Intern**, Department for AIDS Prevention, Wuhan Center for Disease Prevention Control, Wuhan, China

- Developed and administered a pilot study examining female usage and attitudes towards condoms in rural China.
- Collected and reviewed articles concerning sexual behavior among migrant and homosexual populations in China.

TEACHING EXPERIENCE

2013 **Teaching Assistant**, Health Policy and Management Department, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
Professor: Drs. Sydney Dy and Jonathan Weiner
Course Title: Graduate Seminar in Health Services Research and Policy (309.861)

2010 **Teaching Assistant**, Health Policy and Management Department, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
Professor: Dr. Kevin Frick
Course Title: Health Economics I (313.641)

2012 **Academic Volunteer**, Baltimore Reads, Inc., Baltimore, MD

2006-2007 **Tutor**, New Haven Book Bank/America Reads, New Haven, CT

2003-2004 **English Teacher**, University of Science and Technology Beijing, Beijing, China

2002-2003 **Math and Science Tutor**, Bay Area Tutoring Centers, Inc, Berkeley, CA

ACADEMIC AWARDS AND HONORS

2012	Marilyn Bergner Award in Health Services Research, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
2001	Dean's List, University of California, Berkeley, Berkeley, CA

GRANTS

09/2012 - present	Access to care in Asian Americans: Assessing determinants of usual source of care Agency for Healthcare Research and Quality R36 HS021684-01 PI: Eva Chang
9/2009-8/2011	Ruth L. Kirschstein National Research Service Award Institutional Training Grant (T32) Agency for Healthcare Research and Quality PI: Jonathan Weiner

PROFESSIONAL MEMBERSHIPS

2009-present	AcademyHealth
2006-2007	International Society for Pharmacoeconomics and Outcome Research (ISPOR)

PUBLICATIONS

Davis K, **Chang E**, Doty MM. Medicare Beneficiary Experiences with Coverage and Care under Traditional Medicare and Medicare Advantage Compared with Adults under Age 65 with Private Coverage. [Manuscript submitted for publication]

Biles B, Casillas G, Guterman S, Nicholas LH, **Chang E**, Davis K. Could private plans lower Medicare spending? The cost of Medicare Advantage plans compared to Traditional Medicare. [Manuscript submitted for publication]

Segal JB, Bridges JFP, Chang H, **Chang E**, Nassery N, Weiner J, Chan KS. Identifying possible indicators of systematic overuse of healthcare procedures with claims data. [Manuscript accepted for publication]

Nassery N, Segal JB, **Chang E**, Bridges JFP. Defining the systematic overuse of healthcare services. [Manuscript accepted for publication]

Moy E, **Chang E**, Barrett M. Update: Potentially Preventable Hospitalizations – United States, 2001-2009. [Manuscript accepted for publication]

Chan KS, **Chang E**, Nassery N, Chang HY, Segal JB. The State of Overuse Measurement: A Critical Review. Medical Care Research and Review 2013;70:473-496.

PODIUM PRESENTATIONS

Chang E. Variation in healthcare utilization in Asian American adults by neighborhood racial/ethnic concordance. [To be presented at the 2013 APHA Annual Meeting & Exposition]

Chang E. Effect of acculturation on variation in having a usual source of care in Asian American versus Non-Hispanic white adults in California. [To be presented at the 2013 APHA Annual Meeting & Exposition]

Chang E, Hayes D, Roberson E. Characteristics and predictors of low health services utilization after delivery for mothers and infants in Hawaii – Data from Hawaii PRAMS, 2004-2008. Oral presentation at the 2011 Annual Maternal and Child Health Epidemiology (MCH EPI) Conference, New Orleans, LA, December 14-16, 2011.

PEER-REVIEWED ABSTRACTS

Chang E, Moy E. Variations in Cardiovascular Disease Risk among Hispanic and Asian Americans in California. Presented at the 2013 AcademyHealth Annual Research Meeting, Baltimore, MD, June 23-25, 2013.

Chang E, Moy E. Variations in the Use of Cardiovascular Disease Preventive Services among Hispanic and Asian Americans in California. Presented at the 2013 AcademyHealth Annual Research Meeting, Baltimore, MD, June 23-25, 2013.

Chan KS, **Chang E**, Nassery N, Chang HY, Segal JB. The State of Overuse Measurement: A Critical Review. Presented at the 2013 AcademyHealth Annual Research Meeting, Baltimore, MD, June 23-25, 2013.

Chang E, Hayes D. Variations in access to care among Asian Americans, Pacific Islanders, and Non-Hispanic whites. Presented at the 2012 AcademyHealth Annual Research Meeting, Orlando, FL, June 24-26, 2012.

Segal JB, Bridges JFP, Chang HY, **Chang E**, Nassery N, Weiner J, Chan, KS. Use of Overused Procedures as Identified in Claims Data: Importance of Regional Variation and Implications for Intervention. Presented at the 2012 Society of General Internal Medicine 35th Annual Meeting, Orlando, FL, May 9-12, 2012.

Chang E, Chan KS, Kasper JD. Racial and Ethnic Disparities in Healthcare Costs and Financial Burden for Families in the United States, 2007. Presented at the 2011 AcademyHealth Annual Research Meeting, Seattle, WA, June 12-14, 2011.

Chan KS, **Chang E**, Lumpkin SM. Gender and age associations with experience of behavioral health services among consumers in a national commercial behavioral health plan. Presented at the 2011 AcademyHealth Annual Research Meeting, Seattle, WA, June 12-14, 2011.

Chan KS, **Chang E**, Lumpkin SM. Age and Gender association with behavioral service use: Findings from members of a national commercial behavioral health plan. Presented at the 2011 AcademyHealth Annual Research Meeting, Seattle, WA, June 12-14, 2011.

Sangl J, **Chang E**. Measuring Quality of Patient Experience for Short Stay Nursing Home Residents. Presented at the 2011 AcademyHealth Annual Research Meeting, Seattle, WA, June 12-14, 2011.

Wang ST, Huang H, Shi H, Duh MS, Chen K, **Chang E**, Korves C, Dhawan R, Cakana A, van de Velde H, Esseltine DL, Garrison LP. Modeling the cost-effectiveness of bortezomib for the initial treatment of multiple myeloma in the United States. Presented at the 15th ISPOR Annual International Meeting, Atlanta, GA, May 15-19, 2010.

Wang ST, Ivanova J, Antràs L, **Chang E**, Ramamurthy P, Whittemore S, Fortner B, Scott J, Neary M, Duh MS. Safety and treatment (trx) patterns of angiogenesis inhibitors (AIs) in patients (pts) with metastatic renal cell carcinoma (mRCC): evidence from US community oncology

clinics. Presented at joint 15th Congress of the European CanCer Organisation and 34th Congress of the European Society for Medical Oncology, Berlin, Germany, September 24, 2009.

Wang ST, Duh MS, Huang H, White LA, **Chang E**, Esseltine DL, Marantz J. An economic evaluation of bortezomib-based induction therapy in double transplant protocols for newly diagnosed multiple myeloma patients. Presented at the 50th Annual Meeting of the American Society of Hematology, San Francisco, CA, December 6-9, 2008.

Chawla A, White LA, Mitchell D, **Chang E**, Woelkers D, Vargo JM, Rahman MI. Assessing the increased maternal and neonatal healthcare costs associated with preeclampsia. Presented at the 16th World Congress of the International Society for the Study of Hypertension in Pregnancy (ISSHP), Washington, DC, September 21-24, 2008.

Braithwaite T, **Chang E**, Lee S, Narayan S. Community health assets initiative for Latino immigrants in Danbury, CT. Presented at the Connecticut Public Health Association, Rocky Hill, CT, October 27, 2006.

PROFESSIONAL AND SERVICE ACTIVITIES

2012-2013	**Treasurer**, Student Assembly, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
2010-2012	**General Assembly Member**, Student Assembly, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD Committees: Finance and Appropriations, Student Groups, and Quality of Life
2010-2011	**Executive Board Member**, Health Policy and Management Student Coordinating Committee, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD Committee: Academic Programs and Admissions Committee Representative
2000-2003	**Treasurer/Secretary**, Chicanos/Latino in Health Education, University of California, Berkeley, Berkeley, CA